

# THE VASCULAR FLORA OF THE HANCOCK BIOLOGICAL STATION, MURRAY STATE UNIVERSITY, CALLOWAY COUNTY, KENTUCKY

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## ABSTRACT

The vascular flora of the Hancock Biological Station, Murray State University, was surveyed throughout the growing seasons of 1998–1999 and during June 2000, 2001, 2002, and 2006. The 37.5-ha tract lies 23 km from Murray, Kentucky, in northeastern Calloway County contiguous to Kenlake State Resort Park to the north and adjoins the Kentucky Lake shoreline to the east. The study site is situated within the Jackson Purchase of western Kentucky. Vegetation is predominately upland dry and dry-mesic oak-hickory forest. Burned warm-season grassland, early to mid-successional areas, culturally-disturbed areas, and wetland areas are other diverse habitats. Vascular plants consist of 573 specific and infraspecific taxa in 334 genera from 121 families. A total of 469 are native and 104 are exotic species. Of the exotics, 47 are Kentucky invasive pest plant species. Taxonomic representations are one Lycopodiophyta, one Equisetophyta, eight Polypodiophyta, four Pinophyta, and 559 Magnoliophyta.

KEY WORDS: Hancock Biological Station, vascular flora, habitats, oak-hickory forest, field station; invasive exotics, Kentucky Lake

## RESUMEN

La flora vascular del Centro Biológico Hancock de la Universidad Estatal de Murray se estudió durante las temporadas de crecimiento de 1998–1999 y durante junio de 2000, 2001, 2002, y 2006. El terreno de 37,5 hectáreas está ubicado a 23 kilómetros de Murray, Kentucky en la parte noreste del condado de Calloway contiguo al centro recreativo Kenlake State Resort Park hacia el norte y junto a la ribera del lago Kentucky hacia el este. El terreno que se ha investigado está situado dentro del Jackson Purchase del oeste de Kentucky. La vegetación que predomina es el bosque seco-húmedo de roble-nogal americano de las tierras altas. Paraderas quemadas en la estación templada, áreas de sucesión temprana o mediana, áreas afectadas por cultivos y áreas húmedas son otros de los hábitats. Las plantas vasculares son 573 grupos taxonómicos específicos e infraespecíficos de 334 géneros de 121 familias. Un total de 469 son nativas y 104 son especies exóticas. De las exóticas, 47 son especies de plantas invasoras en Kentucky. Representaciones taxonómicas son una Lycopodiophyta, una Equisetophyta, ocho Polypodiophyta, cuatro Pinophyta y 559 Magnoliophyta.

## INTRODUCTION

Hancock Biological Station (HBS), a 37.5-hectare tract of upland Oak-Hickory Forest adjacent to Kentucky Lake, is the biological field station of Murray State University, Murray, Kentucky (Fig. 1). HBS is a member of the Organization of Biological Field Stations, a consortium of 220 biological field stations in North America (OBFS 2006) and a member of the Association of Ecosystems Research Centers. HBS was founded in 1966 through the efforts of Hunter M. Hancock, former Murray State University professor and chair of the Department of Biological Sciences (White 2002). Since 1972, HBS has served as a year-round facility for aquatic and terrestrial biology research and service programs, and it has presented students with opportunities for field classes, independent research, and faculty-directed undergraduate and graduate research (White 2002).

In the early 1980s, HBS and the Land Between the Lakes (LBL) were designated as an Experimental Ecological Reserve by the National Science Foundation and the Institute of Ecology. As an Experimental Ecological Reserve, HBS and LBL serve as an important natural system for long-term ecological research (White 2002). HBS currently serves as the primary field research facility for the Center for Reservoir Research (CRR) established in 1987 by the Commonwealth of Kentucky. Among the CRR's goals is the improvement in knowledge needed to manage, protect, and preserve the environmental quality of reservoir resources. The CRR has become nationally recognized in basic and applied aquatic research and education by providing facilities and a permanent research technical staff (White 2002).

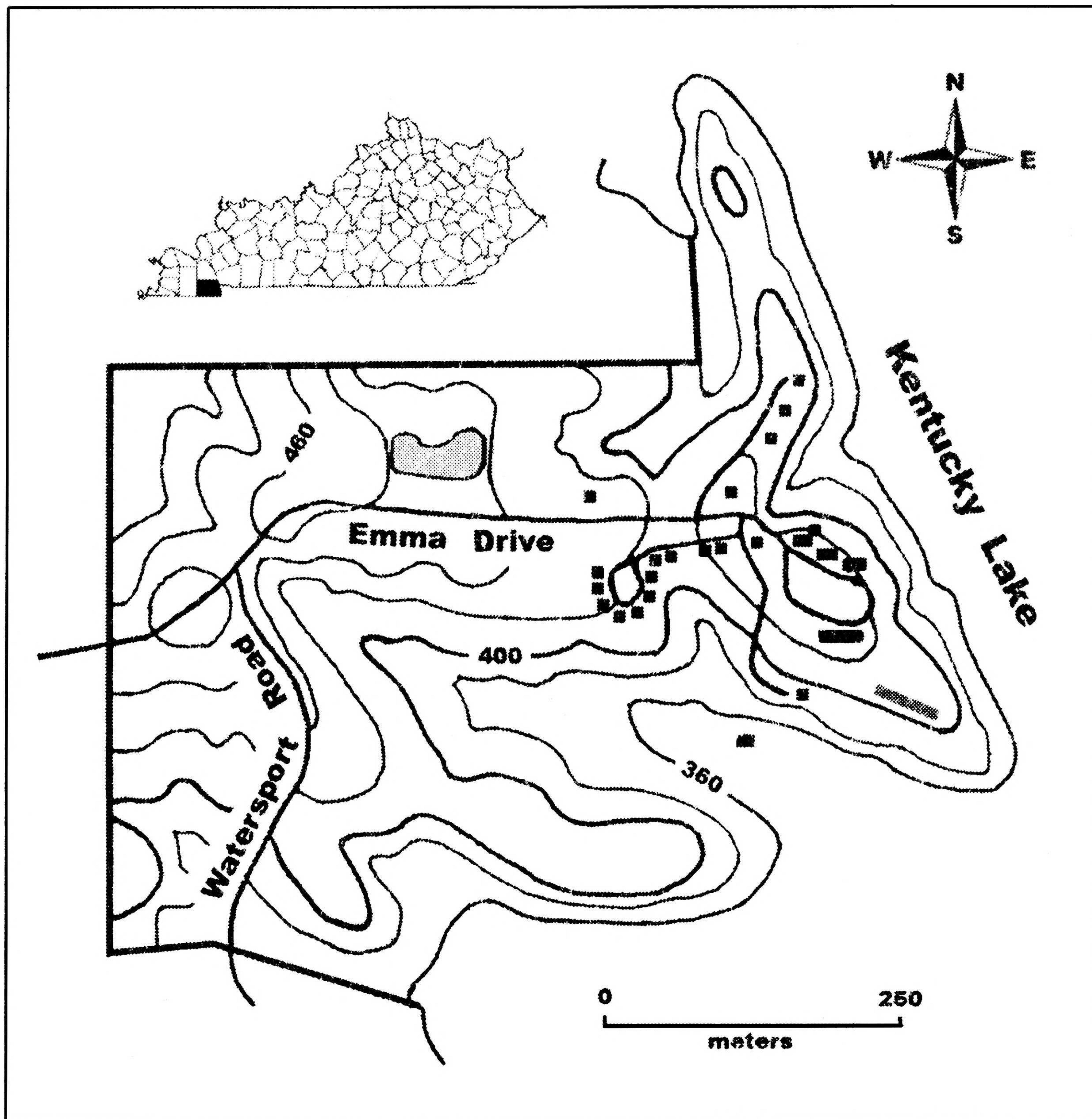


FIG. 1. Hancock Biological Station, Calloway County, Kentucky, on Kentucky Lake. Adapted from the Rushing Creek Quadrangle, 7.5 minute topographic series, 1950, United States Geological Survey, Washington, D.C., and Mid-America Remote Sensing Center (2003a).

To further serve education, in the mid-1980s the Ecological Consortium of Mid-America (ECOMA) was formed among several colleges and universities. The purposes of ECOMA were to utilize the HBS facilities, the LBL resources, and the Kentucky Lake-Barkley Lake complex in undergraduate and graduate teaching, to facilitate service programs, and to serve as a base of operation for field trips and research throughout the year (White 2002).

The Hancock Biological Station was one of five major collection sites for a master's thesis of the vascular flora of Calloway County by Woods (1983). After additional collections were added to the Murray State University Herbarium, the vascular flora of Calloway County was published by Woods and Fuller (1988). To do a thorough floristic survey of just HBS, the objectives of the current descriptive study were to 1) document the HBS vascular flora with voucher specimens, 2) depict the physical site, 3) describe the plant

habitats, and 4) present a complete annotated list of the vascular plants with origins, habitats, and relative abundance values.

#### THE STUDY SITE

##### **History and Facilities**

Hancock Biological Station lies between latitudes 36°44'24" and 36°44'00" N and between longitudes 88°07'30" and 88°06'52"W within the 7.5-minute series Rushing Creek Quadrangle (Fig. 1). Prior to the 1920s, the oak-hickory forests west of the Tennessee River were completely harvested with much of the wood used as fuel for the iron furnaces in the LBL region. Through the 1940s, a large floodplain existed on the west bank of the Tennessee River in front of the present station, and most of the terrain in the uplands was pastures, cultivated fields, or scattered woodlands. The completion of Kentucky Dam on the Tennessee River in 1944 formed Kentucky Lake and impounded much of the upland terrain. In the past 80 years, the present vegetation has evolved from a combination of secondary forest succession and human activities that have limited natural habitats at HBS through the creation of Kentucky Lake .

In 1966, the original station grounds consisted of 16.2 ha of abandoned fields, pastures, and oak-hickory forest stands to the south of Kenlake State Resort Park. An agreement in the late 1960s between Murray State University and the Tennessee Valley Authority (TVA) provided an additional 13.3 ha of land from the 114 m TVA boundary upward. In 1988, Kenlake State Resort Park transferred an additional 8.0 ha to HBS (White 2002). The total HBS tract is currently estimated at 37.5 ha.

HBS facilities currently consist of 26 buildings. Facilities include the main laboratory and classroom building, glasshouse/mesocosm building, a resource building, boat house, bath house, 15 student cabins, four faculty cabins, maintenance shop, and well house, as well as a picnic area and wastewater wetland complex (Fig. 2). The station is reached at the end of the asphalt-paved Emma Drive that leads to Lancaster Road, KY 497, and then to KY 94. Watersport Road leads from the Pacer Point Recreation Area, passes through the western portion of the HBS property, and connects with Emma Drive. Elevation at HBS ranges from 107.9 m at the Kentucky Lake shoreline to the 114.3 m Tennessee Valley Authority boundary to a 143 m ridge crest just west of the junction of Emma Drive and Watersport Road (Fig. 1).

##### **Physiography**

HBS is located in the Jackson Purchase or the Mississippi Embayment Section of the East Gulf Coastal Plain based on Fenneman (1938). Keys et al. (1995) classified the area west of the Tennessee River (the Kentucky Lake impoundment) as belonging to the Deep Loess Hills and Bluffs Subsection of the Upper Gulf Coastal Plain Section of the Eastern Broadleaf Forest Province. Woods et al. (2002) designated the hilly terrain west of Kentucky Lake as a part of the Western Highland Rim extending eastward through the Tennessee River and Cumberland River Valleys.

##### **Geology**

The geology at the study site includes alluvium, loess, and cherty limestone bedrock of the Quaternary, Cretaceous, and Mississippian Carboniferous Series (Seeland and Wilshire 1965; Fig. 3). The exposed flattened ridges and rolling hills are covered with unstratified, clayey, silty loess from the Quaternary Pleistocene that covers continental sand and gravel deposits. Sand, gravel, and clay of the Upper Cretaceous McNairy Formation are found in the southwestern corner of HBS. In a small area by Kentucky Lake, gravel, clay, and clayey silts of the Upper Cretaceous Tuscaloosa Formation overlie Mississippian bedrock. Thick-bedded cherty limestone of the Mississippian Warsaw Limestone Formation is in the extreme northwestern part of the boundary. The largest amount of bedrock at HBS is composed of cherty, fine-grained limestone of the Mississippian Fort Payne Formation. The Fort Payne System bedrock is exposed along the steep cliff line at Kentucky Lake. Quaternary Pleistocene and Recent alluvium comprised of silt, sand, and stratified cherty gravel is found in three lowland valley coves adjacent to Kentucky Lake (Fig. 3).

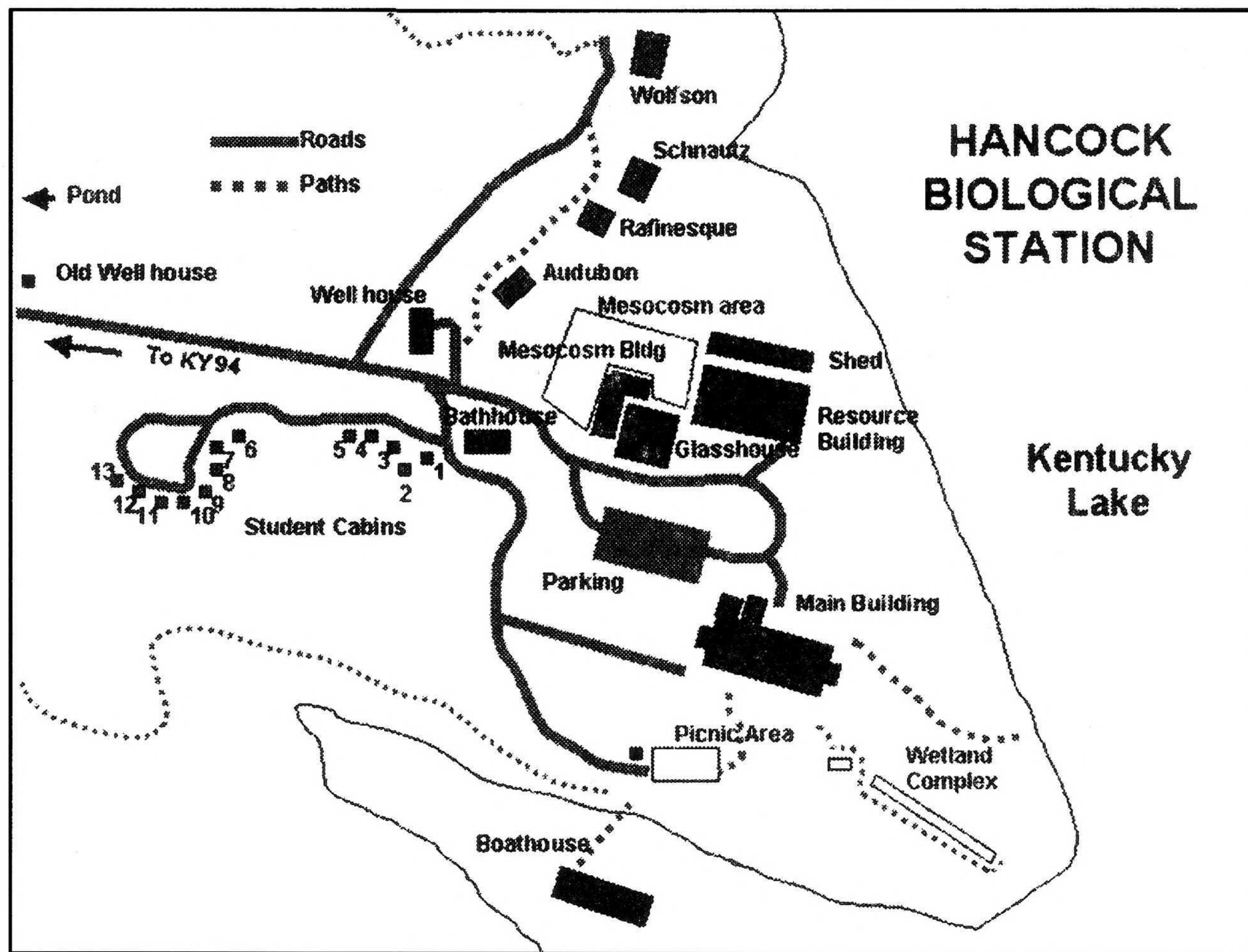


FIG. 2. The physical site facilities of the Hancock Biological Station, directly from <http://www.mursuky.edu/hbs> (Murray State University 2006). (Map not to scale). See Figure 1 for facilities location on the property

### Soils

The principal soil association of HBS and vicinity is the Bodine-Brandon Association (Humphrey et al. 1973; Fig. 4). This soil association predominates on steep to sloping, well-drained to excessively drained, silty cherty uplands. Bodine series are acid to strongly acid (4.5–5.0 pH), well-drained or excessively drained residual cherty limestone soils from the Warsaw Limestone and Fort Payne Formations. These soils are located on 12–60 percent upper to middle slopes and side slopes leading to the Kentucky Lake shoreline. Bodine topsoils are brown cherty silt loams to 13 cm and subsoils are yellowish-brown, cherty silty loams from 15–57 cm, and yellowish-red, very cherty, silty clay loams from 58–157 cm deep. The Brandon series occupy 6–30 percent rolling upper elevation side slopes and flattened ridges at HBS (Fig. 4). These soils are acid to strongly acid (4.5–5.5 pH), well-drained, and are developed in 0.6–1.2 m of loess. Brandon topsoils consist of brown silty loams to 24 cm deep, subsoils of yellowish-red silty clay loams from 25–69 cm, and Coastal Plain gravelly brown loams from 71–127 cm in depth (Humphrey et al. 1973).

A thin band of Saffell series lies between Bodine and Brandon soils on a ridge with 6–12 percent slopes in the west central portion of HBS. Saffell topsoils are acid to strongly acid (4.5–5.5 pH), well-drained, yellowish-brown, very gravelly silt loams 25 cm deep. The subsoils are yellowish-red gravelly loams from 26–88 cm and very gravelly brown sandy loams from 90–150 cm. The Ochlockonee series lies on the 0–4 percent sloping alluvial valley floodplain in the southernmost part of the study site near Pacer Point Recreation Area. Ochlockonee topsoils are strongly acid (5.1–5.5 pH), well-drained, brown silt loams to 18 cm. Subsoils are

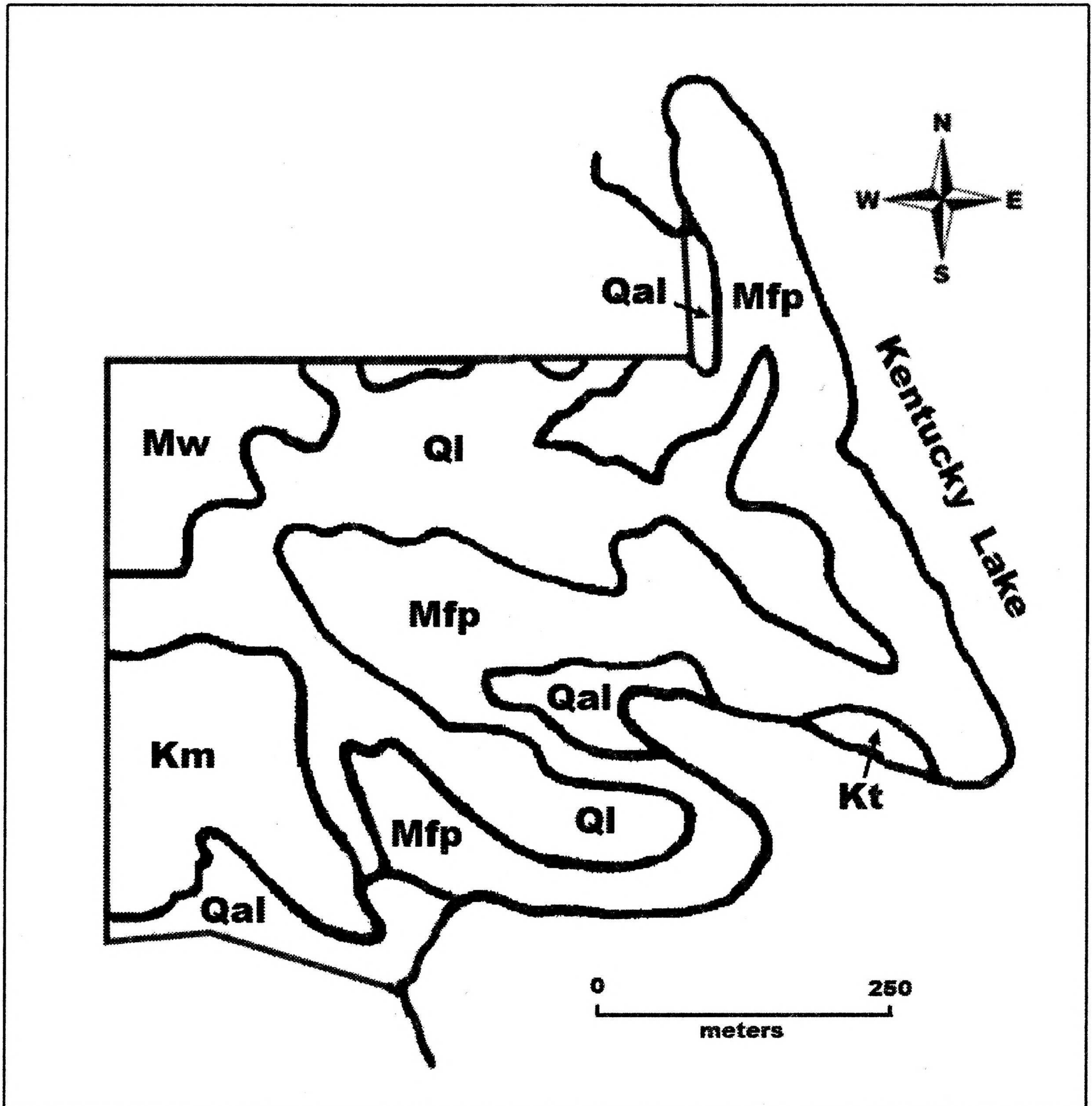


FIG. 3. Geology of the Hancock Biological Station. Modified from Seeland, D.A. and H.G. Wilshire (1965) and Mid-America Remote Sensing Center (2003b). Geology code: Qal = Quaternary alluvium; Ql = Quaternary loess; Km = Upper Cretaceous McNairy Formation; Kt = Upper Cretaceous Tuscaloosa Formation; Mw = Mississippian Warsaw Limestone; Mfp = Mississippian Fort Payne Formation.

brown sandy loams from 18–89 cm and gravelly sandy loams from 90–127 cm in depth (Humphrey et al. 1973).

### Vegetation

The forest vegetation in the Jackson Purchase is predominantly Oak-Hickory Forest (Küchler 1964; Bryant and Held 2001; Woods et al. 2002). Braun (1950) included the Jackson Purchase (Mississippi Embayment Section) in her Western Mesophytic Forest Region based on the mixed mesophytic vegetation composition of the western loess bluffs. Braun (1950) noted that she would have placed the vegetation in her Oak-Hickory Forest Region except for these western loess bluffs. The forest vegetation of Hancock Biological Station is currently a mixture of dry oak-hickory forest and dry-mesic oak-hickory forest (Fig. 5).

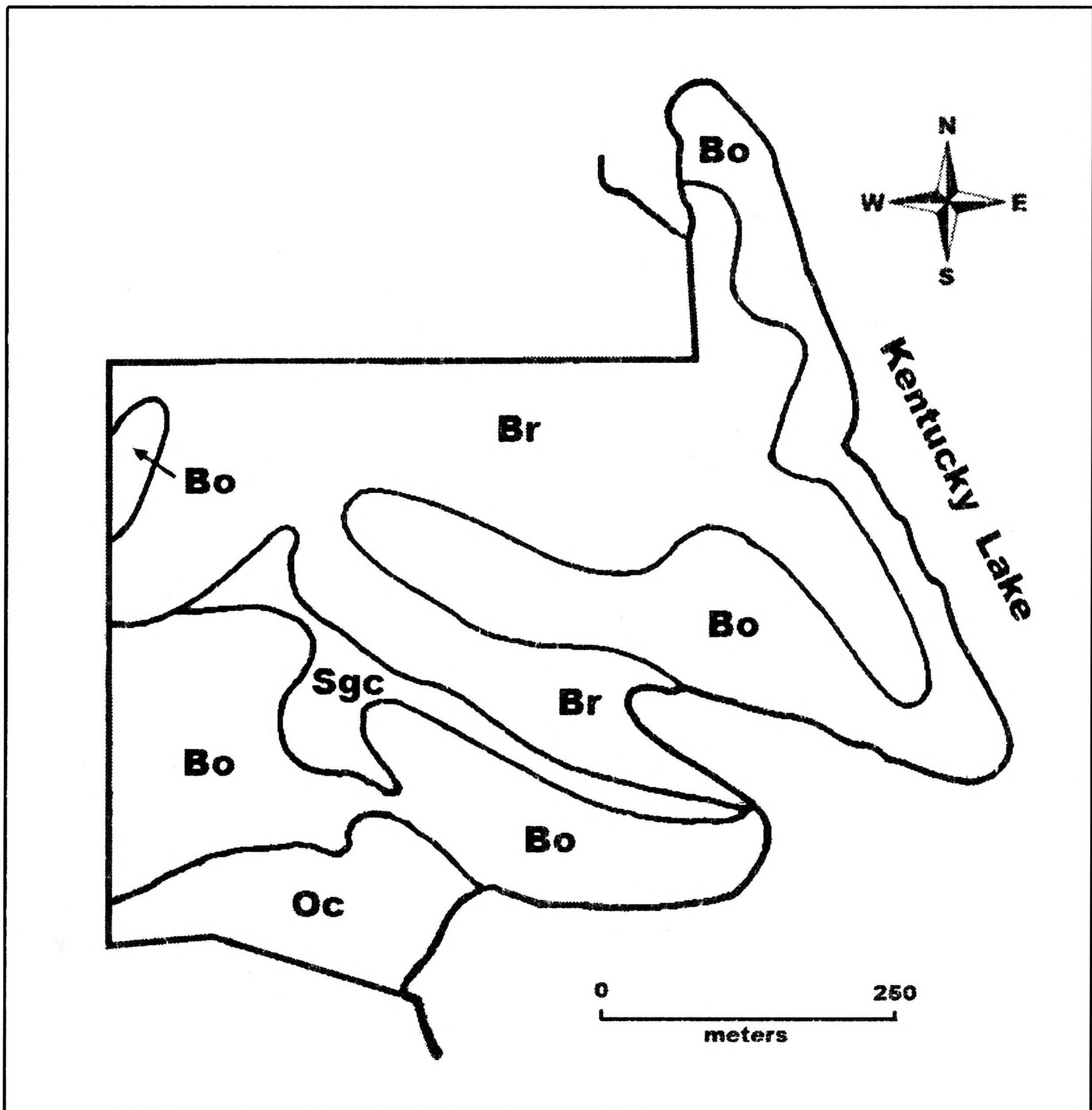


FIG. 4. Soils of the Hancock Biological Station. Modified from Humphrey et al. (1973) and Mid-America Remote Sensing Center (2003c). Soil code: Bo = Bodine cherty silt loams, 12–60% slopes; Br = Brandon silt loam, 6–30% slopes; Oc = Ochlockonee gravelly loams, 0–4% slopes; Sgc = Saffell very gravelly silt loams, 6–12% slopes.

### **Climate**

Climate of the Jackson Purchase is a humid temperate continental type characterized by warm to hot summers and cool to moderately cold winters. Climatic data (1971–2000) are from the United States Department of Agriculture, Forest Service Weather Station at Golden Pond, 13 km east-northeast from HBS. The mean annual temperature is 14.9° C. January is the coldest month at 1.2° C, and July is the warmest month at 26.0° C. The length of the growing season averages 209 days from the median first frost on October 27 to the median last freeze on April 6. Mean annual precipitation is 127 cm and is fairly well distributed throughout the year. August is the driest month at 8.1 cm of precipitation and December is the wettest at 12.9 cm. The mean annual snowfall in January, February, and March is 10.8 cm (Kentucky Climate Center 2006).

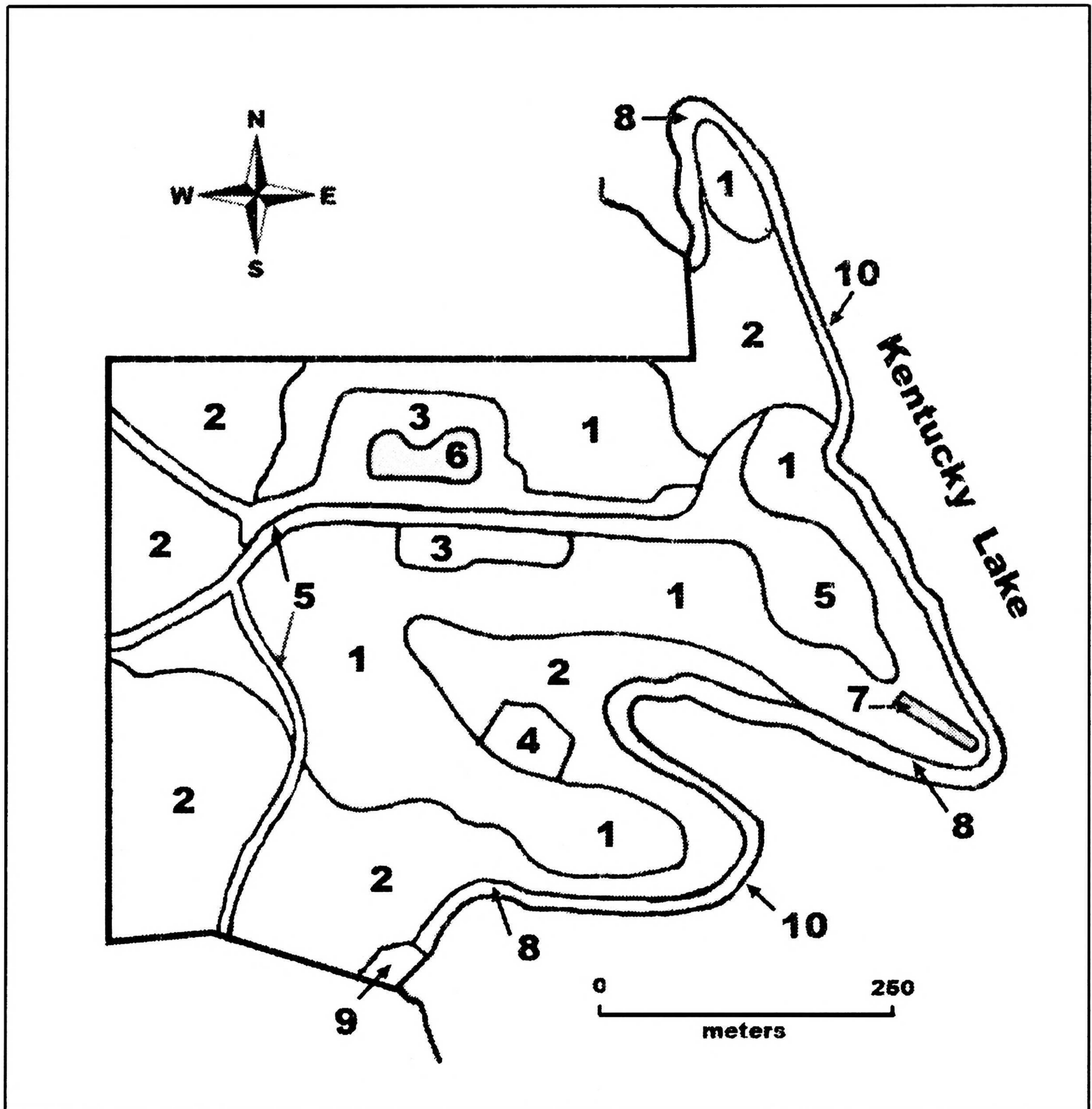


FIG. 5. Habitats of the Hancock Biological Station. Habitat code: 1 = dry oak-hickory forest, 2 = dry-mesic oak-hickory forest, 3 = upland early and mid-successional areas, 4 = burned old-field warm season grassland, 5 = culturally disturbed areas, 6 = pond and roadside ditches, 7 = wetland complex, 8 = riparian forest, 9 = emergent marsh and wetland meadow, 10 = seasonal dewatered shoreline.

#### METHODS

A floristic survey was conducted during the growing seasons from March–November 1998 and 1999 with additional collections in June 2000, 2001, 2002, and 2006. Vascular plants were identified using Mohlenbrock (1986), Gleason and Cronquist (1991), and Jones (2005). Arrangement of families and nomenclature follows Jones (2005). Vernacular names are derived from a combination of Jones (2005) and USDA, NRCS (2006). Plants were collected in duplicate with the master set deposited into the Berea College Herbarium (BEREA) and the second set placed in the herbarium of Hancock Biological Station, a part of the Murray State University Herbarium (MUR). Plant habitats were delineated through field reconnaissance and field collections in conjunction with topographic-moisture features, soil type, underlying geology, vegetation

(dominant and associated species of the canopy, subcanopy, shrub, and herbaceous layers), and anthropogenic disturbances.

A relative abundance value is assigned each taxon inclusive throughout all HBS habitats. Relative abundance categories modified from Thompson and Poindexter (2006) are Rare—1 to 4 individuals or colonies, Scarce—5 to 10 individuals or colonies, Infrequent—11 to 30 individuals or colonies, Occasional—31 to 100 individuals, Frequent—101 to 1000 individuals or colonies, and Abundant—1000s of individuals or colonies.

## RESULTS AND DISCUSSION

### **Taxonomic Summary**

The annotated list from the boundaries of HBS includes 573 specific and infraspecific taxa in 334 genera from 121 families (Table 1). Taxonomic representation is one Lycopodiophyta, one Equisetophyta, eight Polypodiophyta, four Pinophyta, and 559 Magnoliophyta (411 Magnoliopsida and 148 Liliopsida). A total of 104 (18.2 %) were exotic taxa (Table 1). Thirty species, native or exotic, were deliberately planted on the study site. The largest families in species richness are Asteraceae (72), Poaceae (68), Fabaceae (41), Cyperaceae (36), Lamiaceae (21), Rosaceae (17), and Scrophulariaceae (16). The largest genera are *Carex* (20), *Quercus* (11), *Dichanthelium* (10), *Juncus* (8), *Lespedeza* (8), *Polygonum* (8), and *Hypericum* (7). One hundred-five are woody plants (64 trees, 22 shrubs, and 19 vines), and 468 are herbaceous plants (148 annuals, 17 biennials, and 303 perennials).

Woods (1983) listed 912 species, 428 genera, and 119 families from his M.S. thesis on the vascular flora of Calloway County. After more collections, Woods and Fuller (1988) increased the number to 1018 species, 462 genera, and 129 families. In this study at HBS, 573 specific and infraspecific taxa account for 56.3% of the total Calloway County flora based on Woods and Fuller (1988). This number also comprises 22.0% of the 2600 known vascular plant species of Kentucky based on Jones (2005).

Thirty-nine new Calloway County records were documented in the present study from a search of MUR, the vascular plant atlas of Campbell et al. (2006), and the distribution maps from the USDA, NRCS (2006). *Trepocarpus aethusae*, occasional in relative abundance along the Kentucky Lake shoreline, was state-listed “Threatened” in 2000 (KSNPC 2000) and state-listed “Special concern” in 2005 (KSNPC 2006). *Aphanes microcarpa*, an exotic European annual, was first documented in Kentucky from Madison County (Abbott et al. 2001). The collection from HBS is the second county recorded for Kentucky.

### **Invasive Exotic Species**

In Kentucky, 94 invasive exotic plants belong to the “severe threat” (29 species), “significant threat” (33 species), and “lesser threat” (32 species) classifications (Kentucky Exotic Pest Plant Council 2000). The 104 naturalized species at Hancock Biological Station have a definite impact upon the native flora, vegetation, and habitats. Forty-seven (45.2%) of the 104 exotics are invasive pest plants. Twenty-nine species (27.9%) belong to the “severe threat” (14 species) and “significant threat” (15 species) categories. Several of these invasive exotics have become naturalized on the Hancock premises thorough deliberate plantings.

The most notable “severe threat” exotics affecting HBS native vegetation are the abundant and widespread *Festuca arundinacea*, *Lespedeza cuneata*, *Lonicera japonica*, and *Microstegium vimineum*. Among other “severe threat” taxa are *Coronilla varia*, *Elaeagnus umbellata*, *Ligustrum sinense*, *Rosa multiflora*, *Sorghum halepense*, and *Stellaria media*. “Significant threat” exotics include *Daucus carota*, *Eleusine indica*, *Glechoma hederacea*, *Hedera helix*, *Lespedeza stipulacea*, *L. striata*, *Poa pratensis*, *Polygonum caespitosum*, *P. persicaria*, *Seteria faberi*, and *Vinca minor*. The 104 exotic species will continue to have deleterious effects of displacing and replacing native species, disrupting nutrient cycles, and changing the pattern of plant succession.

### **Plant Habitats**

Hancock Biological Station is delineated into 10 habitats: five terrestrial and five wetland. Terrestrial habitats are dry oak-hickory forest, dry-mesic oak-hickory forest, upland early and mid-successional areas, burned old field warm-season grassland, and culturally disturbed areas (Fig. 5). The dry oak-hickory and dry-mesic



TABLE 1. Taxonomic distribution of vascular plants at the Hancock Biological Station, Kentucky.

Division	Families	Genera	Species	Native	Exotic	Percent Species Composition
Equisetophyta	1	1	1	1	0	0.17
Lycopodiophyta	1	1	1	1	0	0.17
Polypodiophyta	4	7	8	8	0	1.40
Pinophyta	3	3	4	4	0	0.70
Magnoliophyta	101	322	559	455	104	97.56
Magnoliopsida	87	248	411	337	74	71.73
Liliopsida	15	74	148	118	30	25.83
<b>Totals:</b>	121	334	573	469	104	100.00

oak-hickory forests are representative of the two types of oak-hickory forest in the Jackson Purchase Area described by Bryant and Held (2001).

The five wetland areas are pond and roadside ditches, wetland complex, riparian forest, emergent marsh and wetland meadow, and seasonally dewatered shoreline (Fig. 5). Transitional ecotones tend to exist between adjacent terrestrial and terrestrial, terrestrial and wetland, and wetland and wetland habitats. These 10 plant habitats are described and characteristic species or indicator species within each habitat are listed.

*Dry oak-hickory forest.*—The woody vegetation of open dry flat to rolling topography on southern and western trending upper slopes, ridge tops, and higher elevations is characterized by dry oak-hickory forest (Fig. 3). Forest soils include Bodine cherty silt loams covered by Quaternary loess and some areas of Brandon silt loams. *Quercus stellata*, *Q. marilandica*, *Q. falcata*, and *Carya glabra* are canopy indicator trees. Other important overstory trees include *Acer rubrum*, *Carya tomentosa*, *Nyssa sylvatica*, *Q. velutina*, and *Ulmus alata*. The understory layer is somewhat scrubby and sparse. Among the shrubs and small trees are *Amelanchier arborea*, *Vaccinium arboreum*, *V. stamineum*, and *Viburnum rufidulum*. A single clump of the hemiparasitic shrub, *Phoradendron leucarpum*, was observed in one *Carya glabra*. Woody vines include *Parthenocissus quinquefolia*, *Smilax bona-nox*, *S. glauca*, *Toxicodendron radicans*, and *Vitis aestivalis*.

Several native herbaceous perennials are found beneath the dry oak-hickory forest. Characteristic perennial herbs include *Antennaria plantaginifolia*, *Asplenium platyneuron*, *Aureolaria flava*, *Carex muehlenbergii*, *Comandra umbellata*, *Coreopsis major*, *Cunila origanoides*, *Danthonia spicata*, *Dichanthelium acuminatum*, *D. boscii*, *D. laxiflorum*, *Euphorbia corollata*, *Galium circaezans*, *Houstonia canadensis*, *Hypoxis hirsuta*, *Lechea tenuifolia*, *Orbexilum pedunculatum*, *Porteranthus stipulatus*, *Pteridium aquilinum* var. *latiusculum*, *Sericocarpus linifolius*, *Scutellaria parvula*, *Symphyotrichum patens*, *Tephrosia virginiana*, and *Viola pedata*. In certain exposed areas, fruticose lichens (*Cladina* spp. and *Cladonia* spp.) and cushiony mosses are abundant.

*Dry-mesic oak-hickory forest.*—These forest stands occur on more mesic, steeper northern, western and eastern trending middle to upper side slopes of shallow valleys and valley coves, and adjoin the Kentucky Lake shoreline (Fig. 5). Forest soils are Brandon silt loams from the Warsaw Limestone and the Fort Payne Formations. Topographic-moisture conditions, slope aspect, and soil types are extremely important in the transitional mosaic of dry-mesic oak-hickory forest to dry oak-hickory forest relative to species composition. A considerable intergradation of woody and herbaceous species exists between these two oak-hickory forest types. *Quercus alba* is the dominant canopy tree. Other indicator canopy trees of dry-mesic oak-hickory forest include *Quercus rubra*, *Q. velutina*, *Carya ovata*, *C. tomentosa*, *Acer rubrum*, *Fraxinus americana*, *Nyssa sylvatica*, *Prunus serotina*, and *Ulmus rubra*. *Diospyros virginiana*, *Juniperus virginiana*, *Morus rubra*, *Sassafras albidum*, and *Ulmus alata* are scattered in the stand. Subcanopy trees are *Cercis canadensis* and *Cornus florida*. Characteristic woody vines and shrubs are *Aralia spinosa*, *Asimina triloba*, *Parthenocissus quinquefolia*, *Rosa carolina*, *Smilax bona-nox*, *S. glauca*, *Staphylea trifolia*, *Toxicodendron radicans*, *Vaccinium stamineum*, *Vitis aestivalis*, and *V. rotundifolia*.

Many perennial herbs are especially evident during spring and summer. Characteristic herbs include *Anemonella thalictroides*, *Brachyelytrum erectum*, *Bromus pubescens*, *Desmodium nudiflorum*, *Dioscorea villosa*, *Galium triflorum*, *Luzula bulbosa*, *Scutellaria elliptica*, *Spigelia marilandica*, and *Viola palmata*. Other perennials of more mesic, shaded side slopes and valley bottoms are *Carex albicans*, *C. blanda*, *C. digitalis*, *Dentaria laciniata*, *Iris cristata*, *Maianthemum racemosum*, *Podophyllum peltatum*, *Polygonatum biflorum*, *Polystichum acrostichoides*, *Solidago caesia*, and *Uvularia sessilifolia*. Representative herbs of the three alluvial valley coves adjoining the riparian forest include *Boehmeria cylindrica*, *Carex grayi*, *C. typhina*, *Chasmanthium latifolium*, *Elymus virginicus*, *Iris virginica*, *Phegopteris hexagonoptera*, *Phryma leptostachya*, *Pilea pumila*, *Polygonum virginianum*, and the abundant “severe threat” *Microstegium vimineum*.

*Upland early and mid-successional areas.*—Most of the area in early and mid-successional stages have developed from a large abandoned pasture of native grasses, forbs, and dry woodland species. Shade intolerant, successional woody species are prevalent in the old pasture and the other disturbed habitats that include dry and dry-mesic oak-hickory forest edges, a narrow power line corridor-cut bordering Emma Drive, and a small 25 year old planted loblolly pine stand (Fig. 5). If succession continues without significant disturbance, these areas will progress toward an oak-dominated forest with a hickory component. Invading trees present are *Acer rubrum*, *Albizia julibrissin*, *Diospyros virginiana*, *Juniperus virginiana*, *Nyssa sylvatica*, *Sassafras albidum*, and *Ulmus alata*. The undergrowth is variable and ranges from sparse to densely vegetated areas. Characteristic successional shrubs include *Rhus copallina*, *R. glabra*, *Rosa setigera*, *Rubus argutus*, *R. flagellaris*, and *Symphoricarpos orbiculatus*. The ubiquitous woody vines are abundant *Lonicera japonica*, *Toxicodendron radicans*, and *Vitis rotundifolia*.

A combination of annuals, biennials, and perennials in the summer and fall aspects are present in the successional areas including several from the Asteraceae, Fabaceae, and Poaceae. Several tall grass prairie species are persisting in the old pasture. Characteristic species in these successional areas are *Ambrosia artemisiifolia*, *Andropogon virginicus*, *Daucus carota*, *Dichanthelium polyanthes*, *Diodia teres*, *Festuca arundinacea*, *Erigeron annuus*, *Eupatorium serotinum*, *Galium pilosum*, *Lespedeza cuneata*, *L. intermedia*, *L. procumbens*, *Monarda fistulosa*, *Pycnanthemum tenuifolium*, *Potentilla simplex*, *Schizachyrium scoparium*, *Setaria parviflora*, *Solidago canadensis*, *Symphyotrichum dumosum*, *S. pilosum*, *Verbesina helianthoides*, and *Vernonia missurica*.

*Burned old field warm season grassland.*—This open dry habitat has several tall grass prairie species and forbs; but, it never was a part of the Midwestern Tall Grass Prairie Region. The habitat (1450 m<sup>2</sup>) was initially derived from an abandoned field with upland dry forest soils, and it is now completely enclosed by dry and dry-mesic oak-hickory forest (Fig. 5). The habitat is representative of the warm season grassland barrens described for Land Between the Lakes by Martin and Taylor (2002). HBS personnel prescribed-burn the site every 1–2 years to preserve a non-forested or grassland habitat and to enhance the persisting warm season prairie elements. Secondary successional woody invaders suppressed by fire in the old field are *Acer rubrum*, *Diospyros virginiana*, *Juniperus virginiana*, *Liquidambar styraciflua*, *Liriodendron tulipifera*, *Nyssa sylvatica*, *Rhus copallina*, *R. glabra*, *Rubus argutus*, *Smilax bona-nox*, and *S. glauca*.

Species composition in this fire-maintained habitat is similar to the warm season grassland of the Elk and Bison Prairie of Land Between the Lakes National Recreation Area (Thompson and Poindexter 2006). Indicator species present are *Andropogon ternarius*, *Asclepias tuberosa*, *Carex hirsutella*, *Ceanothus americanus*, *Coreopsis major*, *Crotalaria sagittalis*, *Hypericum denticulatum*, *Euphorbia corollata*, *Linum medium* var. *texanum*, *Lobelia puberula*, *Parthenium integrifolium*, *Polygala sanguinea*, *P. ambigua*, *Pycnanthemum tenuifolium*, *Oenothera fruticosa*, *Rudbeckia hirta*, *Scleria pauciflora*, *S. triglomerata*, *Schizachyrium scoparium*, *Sorghastrum nutans*, *Stylosanthes biflora*, and *Tripsacum dactyloides*.

*Culturally disturbed areas.*—Anthropogenic-influenced habitats include the mowed irregular-shaped station yard, the mowed Emma Drive road shoulder, the Boy Scout trail, faculty cabins’ trail, the ruderal graveled area around the glasshouse/mesocosm and the gravel roads to student cabins, Wolfson House, and boat house (Figs. 2, 5). Many exotic and native annuals and perennials have become established in these disturbed grassy and gravelly areas. The preeminent taxon is the “severe threat” *Festuca arundinacea*. Other characteristic species include *Bromus commutatus*, *Cardamine hirsuta*, *Cerastium glomeratum*, *Cynodon dactylon*,

*Dactylis glomerata*, *Dichanthelium laxiflorum*, *Digitaria sanguinalis*, *Eleusine indica*, *Gamochaeta purpurea*, *Juncus tenuis*, *Lespedeza cuneata*, *L. stipulacea*, *L. striata*, *Medicago lupulina*, *Oxalis stricta*, *Plantago lanceolata*, *P. rugelii*, *Poa pratensis*, *Stellaria media*, *Taraxacum officinale*, *Trifolium dubium*, *T. repens*, and *Veronica arvensis*.

*Pond and roadside ditches.*—In 2000, Hancock Pond (1300 m<sup>2</sup>) was created within an old successional pasture 20 m from the HBS entrance gateway and 25 m north of Emma Drive (Fig. 5). The borrowed soil was used as fill for the glasshouse/mesocosm (Fig. 2). The pond readily filled with water and hydrosere succession has progressed rapidly for the last six years. Invading emergent species include *Cyperus pseudovegetus*, *Eleocharis ovata*, *Hypericum mutilum*, *Juncus acuminatus*, *J. brachycarpus*, *J. diffusissimus*, *J. effusus* var. *solutus*, *Ludwigia alternifolia*, *Scirpus cyperinus*, and *Typha latifolia*. *Salix nigra* is currently the only woody volunteer. The roadside ditches along Emma Drive and Watersport Road have a few wetland plants established including *Carex lurida*, *Eleocharis ovata*, *Juncus biflorus*, *J. effusus* var. *solutus*, *Ludwigia alternifolia*, *Salix nigra*, *Scirpus cyperinus*, and *Typha latifolia*. These wetland plants from the ditches undoubtedly provide a viable seed source for hydrosere pond succession.

*Wetland complex.*—An artificial-designed gravel-covered wetland (5 m by 40 m or 200 m<sup>2</sup>) was built in 1990 for the station wastewater (Fig. 5). This wetland complex was initially planted with several native wetland species, and other native and exotic wetland species have volunteered. Established wetland species include *Boehmeria cylindrica*, *Carex crinita*, *C. frankii*, *C. lupulina*, *C. vulpinoidea*, *Diodia virginiana*, *Equisetum hyemale*, *Impatiens capensis*, *Hemerocallis fulva*, *Iris virginica*, *I. pseudoacorus*, *Justicia americana*, *Leersia oryzoides*, *Onoclea sensibilis*, *Pontederia cordata*, *Polygonum sagittatum*, *Schoenoplectus tabernaemontani*, *Scirpus atrovirens*, *S. cyperinus*, *Thalia dealbata*, and *Typha latifolia*.

*Riparian forest.*—Riparian forest is scattered along the Kentucky Lake shoreline. It abuts dry-mesic oak hickory forest borders including three low relief, mesic valley bottoms or coves at Pacer Point cove, boat dock cove, and the north peninsula cove (Fig. 5). The Kentucky Lake shoreline is composed of Fort Payne cherty limestone gravel, sand, and silt. Shoreline habitats are annually flooded during the winter and spring months. Riparian indicator trees are *Acer negundo*, *A. saccharinum*, *Betula nigra*, *Liquidambar styraciflua*, *Platanus occidentalis*, and *Salix nigra* with a few *Populus deltoides*, *Taxodium distichum*, two *Quercus lyrata*, and one *Nyssa aquatica*. At the edge of alluvial valley coves and the gravelly shoreline, *Alnus serrulata*, *Amorpha fruticosa*, *Cephalanthus occidentalis*, *Cornus amomum*, *Ilex decidua*, and *Styrax americana* are characteristic shrub-swamp species. Entangled woody vines on trees and shrubs consist of *Bignonia capreolata*, *Brunnichia ovata*, *Campsis radicans*, *Smilax rotundifolia*, *Toxicodendron radicans*, *Vitis palmata*, *V. rotundifolia*, and *Wisteria frutescens*. Characteristic herbs of the riparian forest include many from the dry-mesic oak-hickory forest valley coves and the seasonally dewatered shoreline gravel, sand, and mudflats.

*Emergent marsh and wetland meadow.*—With nearly level relief and saturated soils, a seasonally flooded emergent marsh intermixed with a sedge-grass wetland meadow has developed between HBS Pacer Point cove and Pacer Point Recreation Area (Fig. 5). Riparian shrubs and trees are typically missing. A combination of emergent marsh and meadow species include *Alternanthera philoxeroides*, *Ammannia coccinea*, *Carex frankii*, *C. lupulina*, *C. tribuloides*, *Cyperus strigosus*, *Eleocharis acicularis*, *Fimbristylis autumnalis*, *Hibiscus laevis*, *Hypericum mutilum*, *Juncus effusus* var. *solutus*, *Justicia americana*, *Leersia oryzoides*, *Lindernia dubia*, *Lycopus virginicus*, *Mimulus alatus*, *Panicum rigidulum*, *Phyla lanceolata*, *Polygonum sagittatum*, *Rotala ramosior*, and *Rhynchospora corniculata*.

*Seasonal dewatered shoreline.*—The Kentucky Lake shoreline habitat ranges from steep cherty limestone erosion areas several meters high connecting to oak-hickory forest, to a nearly level or slightly level band of seasonally dewatered gravel, sand, silt, and clay mudflats. The sparsely vegetated shoreline is most prominent in the fall when the water level of Kentucky Lake is lowered to 107.9 m (winter pool) and then disappears when the lake is raised to 109.4 m in spring (summer pool). Among the many native and exotic characteristic annuals are *Acalypha virginica*, *Amaranthus rudis*, *A. tuberculatus*, *Bidens frondosa*, *B. vulgata*, *Diodia virginiana*, *Echinochloa crusgalli*, *Eclipta alba*, *Euphorbia maculata*, *E. nutans*, *Ipomoea lacunosa*, *Myosurus minimus*, *Panicum dichotomiflorum*, *Polygonum caespitosum* var. *longisetum*, *P. persicaria*, *P. pennsylvanicum*, and *Sida spinosa*.

## ANNOTATED LIST OF PLANTS

The annotated list of the vascular flora is arranged alphabetically by family, genus, and species in the Pteridophyta, Pinophyta, and Magnoliophyta (Magnoliopsida and Liliopsida). Nomenclature follows Jones (2005). An asterisk (\*) preceding a scientific name indicates an exotic or non-indigenous taxon. A double asterisk (\*\*) indicates an invasive exotic plant for Kentucky from the Kentucky Exotic Pest Plant Council (2000). A dagger (†) represents a planted native or exotic taxon at HBS. A diesis or double dagger (‡) indicates a new Calloway County distribution record. After the scientific name, plant habitat(s) are given in a numbered code: **1**=dry oak-hickory forest, **2**=dry-mesic oak-hickory forest, **3**=upland early and mid-successional areas, **4**=burned old field warm season grassland, **5**=culturally disturbed areas, **6**=pond and roadside ditches, **7**=wetland complex, **8**=riparian forest, **9**=emergent marsh and wetland meadow, and **10**=seasonal dewatered shoreline. Relative abundance values, Rare (**R**), Scarce (**S**), Infrequent (**I**), Occasional (**O**), Frequent (**F**), and Abundant (**A**), follow habitat(s). An italicized representative voucher number by the author or other collector ends the entry for each species.

## EQUISETOPHYTA

## Equisetaceae

†*Equisetum hyemale* L. var. *affine* (Engelm.) Calder & R.L. Taylor, Common scouring-rush, 7; I; 98-87

## LYCOPODIOPHYTA

## Lycopodiaceae

*Lycopodium digitatum* Dill., Southern ground cedar, 3; R; 99-318

## POLYPODIOPHYTA

## Aspleniaceae

*Asplenium platyneuron* (L.) B.S.P., Ebony spleenwort, 1; I; 98-98

## Dennstaedtiaceae

*Pteridium aquilinum* (L.) Kuhn var. *latiusculum* (Desv.) Underw., Western bracken fern, 1, 2; O; 99-237

## Dryopteridaceae

†*Onoclea sensibilis* L., Sensitive fern, 7; O; 02-213  
*Polystichum acrostichoides* (Michx.) Schott, Christmas fern, 2; O; 99-227  
*Woodsia obtusa* (Spreng.) Torr., Bluntlobe cliff fern, 2; I; 98-190

## Ophioglossaceae

*Botrychium dissectum* Spreng., Cutleaf grape fern, 2; I; 98-718  
*Botrychium virginianum* (L.) Sw., Rattlesnake fern, 2; I; 06-230

## Thelypteridaceae

*Phegopteris hexagonoptera* (Michx.) Fee, Broad-beech fern, 2; S; 06-251

## PINOPHYTA

## Cupressaceae

*Juniperus virginiana* L., Eastern redcedar, 1, 2, 3; O; 98-101  
*Taxodium distichum* (L.) Rich., Bald cypress, 8; S; 98-406

## Pinaceae

†*Pinus taeda* L., Loblolly pine, 3; O; 00-157  
 †*Pinus virginiana* Mill., Virginia pine, 5; R; 99-423

## MAGNOLIOPHYTA—MAGNOLIOPSIDA

## Acanthaceae

*Justicia americana* (L.) Vahl, American water-willow, 7, 9; A; 99-309  
*Ruellia caroliniensis* (J.F. Gmel.) Steud., Carolina wild petunia, 2, 3; O; 98-71

## Aceraceae

‡*Acer barbatum* Michx., Southern sugar maple, 2; I; 02-226  
*Acer negundo* L., Box-elder, 7, 8; O; 98-110  
*Acer rubrum* L. var. *rubrum*, Red maple, 1, 2, 3, 4; A; 99-29  
*Acer saccharinum* L., Silver maple, 8; O; 99-02

## Amaranthaceae

\**Alternanthera philoxeroides* (Mart.) Griseb., Alligator-weed, 9, 10; A; 01-241  
 \**Amaranthus rudis* J.D. Sauer, Water-hemp, 10; O; 99-451  
 \**Amaranthus retroflexus* L., Redroot amaranth, 10; S; 99-449  
*Amaranthus tuberculatus* (Moq.) J.D. Sauer, Roughfruit amaranth, 10; I; Fuller 3000

## Anacardiaceae

*Rhus copallina* L., Winged sumac, 1, 3, 4; F; 98-324  
*Rhus glabra* L., Smooth sumac, 3, 4; O; 98-111  
*Toxicodendron radicans* (L.) Kuntze, Eastern Poison Ivy, 1, 2, 3, 5, 8; A; 02-209

## Annonaceae

*Asimina triloba* (L.) Dunal, Pawpaw, 2; O; 98-415

## Apiaceae

*Angelica venenosa* (Greenway) Fernald, Hairy angelica, 4; R; 98-426  
*Chaerophyllum tainturieri* Hook., Hairyfruit chervil, 3, 5; F; 99-110  
*Cicuta maculata* L., Spotted water hemlock, 9, 10; I; 98-440  
 \*\**Daucus carota* L., Queen Anne's lace, 3, 5; F; 06-247  
*Eryngium prostratum* Nutt., Creeping eryngo, 5; I; 98-366  
*Sanicula canadensis* L., Canadian snakeroot, 2; O; 99-274  
 ‡\**Torilis arvensis* (Huds.) Link, Spreading hedge-parsley, 5; S; 98-383  
*Trepocarpus aethusae* Nutt. ex DC., White nymph, 2, 8; O; 01-209

**Apocynaceae**

*Amsonia tabernaemontana* Walter, Eastern bluestar, 3; R; 99-308

*Apocynum cannabinum* L., Indian-hemp, 3, 5; I; 98-01

†\*\**Vinca minor* L., Common periwinkle, 5; O; 01-214

**Aquifoliaceae**

*Ilex decidua* Walter, Deciduous holly, 2; R; 02-236

**Araliaceae**

*Aralia spinosa* L., Hercules-club, 2; O; 06-225

†\*\**Hedera helix* L., English ivy, 5; I; 98-56

**Aristolochiaceae**

*Aristolochia serpentaria* L., Virginia snakeroot, 2; R; 99-338

**Asclepiadiaceae**

*Ampelamus albidus* (Nutt.) Britton, Honeyvine, 2, 3; S; 98-567

*Asclepias amplexicaulis* Sm., Claspink milkweed, 4; R; 99-232

*Asclepias perennis* Walter, Aquatic milkweed, 8, 9; S; 99-386

*Asclepias syriaca* L., Common milkweed, 1, 3; S; 98-168

*Asclepias tuberosa* L., Butterfly milkweed, 3, 4; I; 01-178

*Asclepias variegata* L., Redring milkweed, 2; I, S; 98-44

‡*Matelea gonocarpos* (Walter) Shinnars, Angularfruit milkvine, 3; R; 98-134

**Asteraceae**

\**Achillea millefolium* L., Common yarrow, 3, 4; I; 00-166

*Ageratina altissima* (L.) R.M. King & H.E. Rob., White snakeroot, 2; I; 01-607

*Ambrosia artemisiifolia* L., Annual ragweed, 3, 5; F; 01-150

*Ambrosia trifida* L., Giant ragweed, 3; O; 98-431

*Antennaria plantaginifolia* (L.) Richardson, Plantain pussytoes, 1; O; 99-28

*Bidens aristosa* (Michx.) Britton, Bearded beggar-tick, 6; S; 99-435

*Bidens bipinnata* L., Spanish needles, 5; S; Woods 818

*Bidens frondosa* L., Devil's beggar-tick, 9, 10; F; 01-601

*Bidens vulgata* Greene, Big devil's beggar-tick, 9; I; 01-608

*Boltonia asteroides* (L.) L'Her. var. *recognita* (Fernald & Griscom) Cronquist, White doll's daisy, 3; I; 98-690

\*\**Chrysanthemum leucanthemum* L., Ox-eye daisy, 3, 5; I; 99-82

\*\**Cichorium intybus* L., Chicory, 5; S; 98-384

*Cirsium discolor* (Muhl. ex Willd.) Spreng., Field thistle, 3; I; 98-570

‡\**Cirsium vulgare* (Savi) Ten., Bull thistle, 3; R; 98-583

*Conoclinium coelestinum* L., Blue mistflower, 9; I; 01-634

*Conyza canadensis* (L.) Cronquist, Horseweed, 5; O; 99-442

‡*Coreopsis auriculata* L., Lobed tickseed, 2; R; 98-395

†*Coreopsis lanceolata* L., Lanceleaf tickseed, 3; I; 99-179

*Coreopsis major* Walter, Greater tickseed, 1, 4; O; 01-120

*Coreopsis tinctoria* Nutt. var. *tinctoria*, Golden tickseed, 3, 5; S; 01-222

*Coreopsis tripteris* L., Tall tickseed, 1, 2; I; 98-552

†\**Cosmos bipinnatus* Cav., Garden cosmos, 3; S; 01-360

\**Eclipta prostrata* (L.) L., False daisy, 9, 10; S; 98-662

*Elephantopus carolinianus* Raeusch., Carolina elephant's-foot, 2; I; 98-707

*Erechtites hieraciifolia* (L.) Raf. ex DC., American burnweed, 5; I; 01-614

*Erigeron annuus* (L.) Pers., Annual fleabane, 3, 4, 5; F; 01-105

*Erigeron philadelphicus* L., Philadelphia fleabane, 5; I; 06-227

*Erigeron strigosus* Muhl. ex Willd., Prairie fleabane, 2, 4; F; 00-160

*Eupatorium fistulosum* Barratt, Trumpetweed, 3, 4; O; 98-550

*Eupatorium perfoliatum* L., Common boneset, 3, 9; O; 99-419

*Eupatorium serotinum* Michx., Lateflowering thoroughwort, 6, 9; O; 01-603

*Eupatorium sessilifolium* L., Upland boneset, 2; S; 98-587

*Euthamia graminifolia* (L.) Nutt. ex Cass., Flat-top goldenrod, 3, 6; I; 99-411

*Gamochaeta purpurea* (L.) Cabrera, Spoonleaf purple everlasting, 2, 5; F; 02-204

*Helenium flexuosum* Raf., Purplehead sneezeweed, 6; S; 98-594

*Helianthus angustifolius* L., Swamp sunflower, 3; I; 01-625

*Helianthus divaricatus* L., Woodland sunflower, 2, 3; I; 98-405

*Helianthus hirsutus* Raf., Hairy sunflower, 1; O; 99-412

*Helianthus microcephalus* Torr. & A. Gray, Small woodland sunflower, 2, 3; O; 98-548

*Hieracium gronovii* L., Beaked hawkweed, 1; O; 98-623

*Krigia biflora* (Walter) S.F. Blake, Twoflower dwarf-dandelion, 2, 3; O; 99-51

*Krigia caespitosa* (Raf.) K.L. Chambers, Weedy dwarf-dandelion, 5; O; 06-229

*Krigia dandelion* (L.) Nutt., Potato dwarf-dandelion, 1; I; 99-60

*Lactuca canadensis* L., Canada lettuce, 3; O; 98-347

*Lactuca floridana* (L.) Gaertn., Woodland lettuce, 2, 3; I; 98-545

\**Lactuca serriola* L., Prickly lettuce, 3; S; 99-312

*Liatris squarrosa* (L.) Michx., Plains blazing-star, 1, 3; I; 99-520

*Liatris squarrulosa* Michx., Southern blazing-star, 1, 3; O; 99-427

‡*Matricaria discoidea* DC., Disc mayweed, 3; R; 99-244

*Mikania scandens* (L.) Willd., Climbing hempvine, 8; R; 98-686

*Packera glabella* (Poir.) C. Jeffrey, Yellowtop, 10; F; 99-03

*Parthenium integrifolium* L., Wild quinine, 1, 4; O; 01-121

*Pluchea camphorata* (L.) DC., Marsh fleabane, 8; R; 99-460

*Pseudognaphalium obtusifolium* (L.) Hilliard & B.L. Burtt., Fragrant cudweed, 3; I; 98-639

*Pyrrhopappus carolinianus* (Walter) DC., Carolina desert-chicory, 3, 5; I; 99-283

*Rudbeckia hirta* L., Black-eyed susan, 3, 4; O; 98-67

*Sericocarpus linifolius* (L.) B.S.P., Narrowleaf white-topped aster, 1, 3, 4; O; 01-245

*Solidago caesia* L., Axillary goldenrod, 2; O; 98-706

*Solidago canadensis* L., Canada goldenrod, 3, 4; F; 01-610

*Solidago juncea* Aiton, Early goldenrod, 3; F; 99-328

*Solidago nemoralis* Aiton, Gray goldenrod, 3; O; 98-643

*Solidago odora* Aiton, Anise-scented goldenrod, 4; I; 01-612

*Solidago speciosa* Nutt. var. *erecta* (Pursh) McMillan, Showy goldenrod, 1; O; 01-622

\**Sonchus asper* (L.) Hill, Spiny sow-thistle, 5; R; 98-456

*Symphotrichum dumosum* (L.) G.L. Nesom, Longstalk aster, 3, 4; F; 01-619

*Symphyotrichum lateriflorum* (L.) A. Love & D. Love, Calico aster, 2, 3; I; 01-617

‡*Symphyotrichum ontarione* (Wiegand) G.L. Nesom, Bottomland aster, 10; O; 01-611

*Symphyotrichum patens* (Aiton) G.L. Nesom var. *patens*, Claspig aster, 1; O; 01-633

*Symphyotrichum pilosum* (Willd.) G.L. Nesom, Hairy white old-field aster, 3; F; 01-615

\**Taraxacum officinale* G.H. Weber ex Wiggers, Common dandelion, 5; F; 99-12

*Verbesina helianthoides* Michx., Ozark wingstem sunflower, 3; O; 00-163

*Vernonia missurica* Raf., Missouri ironweed, 3; O; 01-604

*Xanthium strumarium* L., Rough cocklebur, 10; F; 98-657

### Balsaminaceae

*Impatiens capensis* Meerb., Orange jewelweed, 7, 8, 9, 10; A; 98-432

### Berberidaceae

*Podophyllum peltatum* L., May-apple, 2; O; 99-20

### Betulaceae

*Alnus serrulata* (Aiton) Willd., Hazel alder, 8; O; 99-445

*Betula nigra* L., River birch, 8; O; 99-242

*Corylus americana* Walter, American hazelnut, 2; S; 98-224

‡*Ostrya virginiana* (Mill.) K. Koch, Hop-hornbeam, 3; I; 01-224

### Bignoniaceae

*Bignonia capreolata* L., Cross-vine, 8; F; 98-163

*Campsis radicans* (L.) Seem. ex Bureau, Trumpet-creeper, 8, 10; O; 01-204

### Boraginaceae

*Cynoglossum virginianum* L., Wild comfrey, 2; R; 02-234

*Myosotis macrosperma* Engelm., Largeseed forget-me-not, 3; I; 99-183

### Brassicaceae

\**Arabidopsis thaliana* (L.) Heynh, Mouse-ear cress, 5; O; 99-73

\**Capsella bursa-pastoris* (L.) Medik., Shepherd's purse, 5; R; 99-41

\**Cardamine hirsuta* L., Hairy bittercress, 5, 10; A; 99-16

*Cardamine parviflora* L., Dryland bittercress, 2; I; 99-98

*Cardamine pensylvanica* Muhl. ex Willd., Pennsylvania bittercress, 10; I; 99-05

*Dentaria laciniata* Muhl. ex Willd., Cutleaf toothwort, 2; I; 99-18

*Draba brachycarpa* Nutt. ex Torr. & A. Gray, Shortfruit whitlow-grass, 5; I; 99-33

\**Draba verna* L., Whitlow-grass, 5; F; 99-13

*Lepidium virginicum* L., Wild peppergrass, 5; I; 00-167

*Rorippa sessiliflora* (Nutt.) Hitchc., Marsh yellowcress, 9; O; 99-45

\**Sisymbrium officinale* (L.) Scop., Hedge-mustard, 5; S; 99-175

### Callitrichaceae

‡*Callitriche terrestris* Raf., Terrestrial water starwort, 5; S; Poindexter 06-133

### Campanulaceae

*Campanulastrum americanum* (L.) Small, American bellflower, 2; R; 98-325

*Lobelia inflata* L., Indian tobacco, 5, 10; I; 99-336

*Lobelia puberula* Michx., Downy lobelia, 3, 4; O; 01-621

*Lobelia spicata* Lam., Spiked lobelia, 3; R; Hunter & Austin 1807

*Triodanis perfoliata* (L.) Nieuwl. var. *biflora* (Ruiz & Pav.) Bradley, Venus' looking glass, 1, 5; I; 98-69

*Triodanis perfoliata* (L.) Nieuwl. var. *perfoliata*, Venus' looking glass, 5; F; 00-165

### Caprifoliaceae

\*\**Lonicera japonica* Thunb., Japanese honeysuckle, 2, 4, 5, 8; A; 98-03

*Sambucus canadensis* L., Common elderberry, 2; 8; I; 01-164

*Symphoricarpos orbiculatus* Moench, Coralberry, 2, 3; O; 98-375

*Viburnum rufidulum* Raf., Rusty blackhaw, 1, 2; I; 99-111

### Caryophyllaceae

\*\**Arenaria serpyllifolia* L., Thymeleaf sandwort, 5; F; 01-101

\**Cerastium brachypetalum* Desportes ex Pers., Gray mouse-ear chickweed, 5; R; 99-104

\**Cerastium glomeratum* Thuill., Clammy mouse-ear chickweed, 5; F; 99-56

‡*Cerastium nutans* Raf., Nodding mouse-ear chickweed, 5; S; 99-52

\**Cerastium vulgatum* L., Common mouse-ear chickweed, 5; O; 98-66

\*\**Dianthus armeria* L., Deptford pink, 5; I; 00-151

*Silene antirrhina* L., Sleepy catchfly, 5; S; 99-138

*Silene stellata* (L.) W.T. Aiton, Starry campion, 2; S; 98-414

*Silene virginica* L., Fire pink, 2; I; 99-22

\*\**Stellaria media* (L.) Vill., Common chickweed, 5; F; 99-53

### Chenopodiaceae

\*\**Chenopodium album* L., Lamb's-quarters, 10; S; 01-168

### Cistaceae

*Lechea mucronata* Raf., Hairy pinweed, 1; S; 98-511

‡*Lechea tenuifolia* Michx., Narrowleaf pinweed, 1; F; 01-218

### Clusiaceae

*Hypericum denticulatum* Walter, Coppery St. John's-wort, 1, 3, 4; O; 99-332

*Hypericum drummondii* (Grev. & Hook.) Torr. & A. Gray, Nits-and-lice, 1; R; 98-493

*Hypericum hypericoides* (L.) Crantz subsp. *hypericoides*, St. Andrew's-cross, 2; O; 01-184

*Hypericum mutilum* L., Marsh St. John's-wort, 6, 9; O; 99-390

‡*Hypericum prolificum* L., Shrubby St. John's-wort, 2; S; 99-314

*Hypericum punctatum* Lam., Dotted St. John's-wort, 2, 3, 4; O; 01-199

*Hypericum stragulum* W.P. Adams & N. Robson, St. Andrew's-cross, 1, 3, 4; O; 98-409

### Convolvulaceae

\**Calystegia sepium* (L.) R. Br. var. *sepium*, Hedge bindweed, 8; I; 99-379

\*\**Ipomoea hederacea* Jacq., Ivyleaf morning-glory, 10; R; 99-439

*Ipomoea lacunosa* L., White morning-glory, 10; F; 98-665

### Cornaceae

*Cornus amomum* Mill., Silky dogwood, 8; I; 01-117

*Cornus florida* L., Flowering dogwood, 2, 3, 5; O; 99-26

### Cucurbitaceae

‡*Melothria pendula* L., Creeping cucumber, 5; R; 98-604

*Sicyos angulatus* L., Bur cucumber, 2, 8; S; 01-643

### Cuscutaceae

*Cuscuta pentagona* Engelm., Field dodder, 5; O; 99-302

### Ebenaceae

*Diospyros virginiana* L., Persimmon, 2, 3, 8; F; 98-130

### Elaeagnaceae

†\*\**Elaeagnus umbellata* Thunb., Autumn-olive, 5; S; 99-32

### Ericaceae

*Vaccinium arboreum* Marshall, Sparkleberry, 1; F; 00-156

*Vaccinium stamineum* L., Deerberry, 1, 2; O; 01-216

### Euphorbiaceae

*Acalypha rhomboidea* Raf., Rhomboid copperleaf, 5, 10; I; 99-463

*Acalypha virginica* L., Virginia copperleaf, 5, 10; F; 98-561

*Croton capitatus* Michx., Woolly croton, 5; R; 98-621

*Croton glandulosus* L. var. *septentrionalis* (L.) Muell.-Arg., Toothleaf croton, 3; I; 98-711

*Croton monanthogynus* Michx., Prairie-tea, 5; O; 98-370

*Euphorbia corollata* L., Flowering spurge, 1, 3, 4; O; 98-356

*Euphorbia maculata* L., Spotted sandmat, 5; 10; F; 99-431

*Euphorbia nutans* Lag., Eyebane spurge, 5, 10; O; 98-684

*Phyllanthus caroliniensis* Walter, Carolina leaf-flower, 10; R; 99-443

### Fabaceae

\*\**Albizia julibrissin* Durazz., Mimosa, 3, 5; O; 01-165

*Amorpha fruticosa* L., False indigo, 8; S; 99-224

*Cercis canadensis* L., Eastern redbud, 2, 3, 5; O; 99-31

*Chamaecrista fasciculata* (Michx.) Greene, Partridge-pea, 3, 4; O; 98-596

*Chamaecrista nictans* (L.) Moench., Sensitive-pea, 3, 4; I; 98-584

*Clitoria mariana* L., Butterfly pea, 2, 3; I; 00-321

\*\**Coronilla varia* L., Crown-vetch, 5; O; 01-128

*Crotalaria sagittalis* L., Weedy rattlebox, 4; R; 99-325

‡*Desmodium glabellum* (Michx.) DC., Smooth tick-trefoil, 3, 5; O; 98-692

‡*Desmodium glutinosum* (Muhl. ex Willd.) A. Wood, Clustered tick-trefoil, 2; S; 98-398

*Desmodium marilandicum* (L.) DC., Maryland tick-trefoil, 2, 3; I; 98-588

*Desmodium nudiflorum* (L.) DC., Naked tick-trefoil, 2; O; 99-320

*Desmodium paniculatum* (L.) DC., Panicked tick-trefoil, 3; O; 98-651

*Desmodium rotundifolium* DC., Roundleaf tick-trefoil, 1; S; 98-571

‡*Dioclea multiflora* (Torr. & A. Gray) C. Mohr, Cluster-pea, 1; S; 98-303

*Galactia volubilis* (L.) Britton, Hairy milk-pea, 3; O; 99-326

*Gleditsia triacanthos* L., Honey locust, 2; R; 98-326

\*\**Lespedeza cuneata* (Dum.-Cours.) G. Don, Sericea lespedeza, 3, 5; A; 01-635

*Lespedeza hirta* (L.) Hornem., Hairy lespedeza, 1; O; 01-618

*Lespedeza intermedia* (S. Wats.) Britton, Wand lespedeza, 1, 3; O; 98-703

*Lespedeza procumbens* Michx., Downy trailing lespedeza, 3; F; 98-699

*Lespedeza repens* (L.) Barton, Smooth trailing lespedeza, 3; O; 99-202

\*\**Lespedeza stipulacea* Maxim., Korean clover, 3, 5; A; 98-379

‡\*\**Lespedeza striata* (Thunb.) Hook. & Arn., Japanese clover, 3, 5; A; 01-636

*Lespedeza virginica* (L.) Britton, Virginia lespedeza, 3; I; 98-626

†\**Lotus corniculatus* L., Birdsfoot-trefoil, 3; R; 01-203

\*\**Medicago lupulina* L., Black medic, 5, 10; F; 06-246

\*\**Melilotus alba* Medik., White sweet-clover, 3; 5; I; 01-221

\*\**Melilotus officinalis* (L.) Lam., Yellow sweet-clover, 5; R; 06-248

*Orbexilum pedunculatum* (Mill.) Rydb., Sampson's snakeroot, 1; O; 98-18

*Robinia pseudoacacia* L., Black locust, 2; O; 99-91

*Strophostyles umbellata* (Muhl. ex Willd.) Britton, Perennial woolly-bean, 3; S; 98-595

*Stylosanthes biflora* (L.) B.S.P., Pencil-flower, 3, 4; O; 99-234

*Tephrosia virginiana* (L.) Pers., Virginia goat's-rue, 1; O; 01-124

\**Trifolium campestre* Schreb., Pinnate hop-clover, 5; S; 98-46

‡\**Trifolium dubium* Sibth., Little hop-clover, 5; A; 01-102

†\**Trifolium pratense* L., Red clover, 3, 5; O; 02-237

\**Trifolium repens* L., White clover, 5; A; 01-139

\**Vicia sativa* L., Common vetch, 5; S; 99-215

\**Vicia villosa* Roth var. *varia* (Host) Corb., Winter vetch, 3; R; 01-253

*Wisteria frutescens* (L.) Poir., American wisteria, 8; O; 98-412

### Fagaceae

*Fagus grandifolia* Ehrh., American beech, 2; S; 99-290

*Quercus alba* L., White oak, 1, 2; A; 98-540

*Quercus coccinea* Muenchh., Scarlet oak, 1, 2; R; 98-369

*Quercus falcata* Michx., Southern red oak, 1, 2; F; 98-564

*Quercus imbricaria* Michx., Shingle oak, 2; I; 98-449

*Quercus lyrata* Walter, Overcup oak, 8; R; 99-424

*Quercus marilandica* Muenchh., Blackjack oak, 1; F; 99-200

‡*Quercus muhlenbergii* Engelm., Chinkapin oak, 2; R; 98-41

*Quercus rubra* L., Northern red oak, 2; F; 98-345

†*Quercus shumardii* Buckley, Shumard oak, 5; R; 98-603

*Quercus stellata* Wangenh., Post oak, 1, 2; A; 98-123

*Quercus velutina* Lam., Black oak, 1, 2, 3; A; 02-231

### Gentianaceae

*Sabatia angularis* (L.) Pursh, Rose marsh-pink, 3, 6; I; 99-324

### Geraniaceae

*Geranium carolinianum* L., Carolina crane's-bill, 3, 5; O; 99-116

**Haloragaceae**

‡\**Myriophyllum spicatum* L., European water-milfoil, 9; I; Fuller 3004

**Hamamelidaceae**

*Liquidambar styraciflua* L., Sweetgum, 2, 4, 8; O; 98-192

**Hippocastanaceae**

†*Aesculus pavia* Aiton, Red buckeye, 2; R; 99-334

**Hydrangeaceae**

*Hydrangea cinerea* Small, Wild hydrangea, 2; I; 01-207

**Juglandaceae**

‡*Carya cordiformis* (Wangenh.) K. Koch, Bitternut hickory, 2; R; 99-218

*Carya glabra* (P. Mill.) Sweet, Pignut hickory, 1, 2; A; 02-223

*Carya ovata* (P. Mill.) K. Koch, Shagbark hickory, 2, 3; A; 98-231

‡*Carya pallida* (Ashe) Engl. & Graebn., Pale hickory, 2; S; 98-197

*Carya tomentosa* (Poir.) Nutt., Mockernut hickory, 2, 3; A; 02-230

**Lamiaceae**

\*\**Glechoma hederacea* L., Ground-ivy, 5; O; 01-255

*Cunila origanoides* (L.) Britton, Maryland dittany, 1; O; 98-717

*Hedeoma pulegioides* (L.) Pers., American false pennyroyal, 2; R; Woods 819

\*\**Lamium amplexicaule* L., Henbit, 5; I; 99-11

\**Lamium purpureum* L., Purple dead-nettle, 5; O; 99-14

*Lycopus virginicus* L., Virginia water-horehound, 9; S; 98-682

†\*\**Mentha × piperita* L., Peppermint, 7; R; 00-322

*Monarda fistulosa* L. subsp. *mollis* (L.) Benth., Wild bergamot, 3; 4; I; 01-170

\**Perilla frutescens* (L.) Britton, Beefsteak plant, 10; R; 98-710

*Prunella vulgaris* L. var. *lanceolata* (W. Barton) Fernald, Self-heal, 3, 5; O; 98-64

*Pycnanthemum pycnanthemoides* (Leavenw.) Fernald, Southern mountain mint, 3, 4; I; 01-623

*Pycnanthemum tenuifolium* Schrad., Slender mountain mint, 3, 4; O; 99-285

‡*Pycnanthemum virginianum* (L.) Durand & A.B. Jackson, Virginia mountain mint, 3; S; 98-519

*Salvia lyrata* L., Wild sage, 2, 5; O; 99-151

*Scutellaria elliptica* Muhl., Hairy skullcap, 2; O; 00-158

*Scutellaria incana* Biehler, Downy skullcap, 2; I; 98-294

*Scutellaria integrifolia* L., Largeflower skullcap, 2; I; 99-167

*Scutellaria ovata* Hill, Heartleaf skullcap, 2; R; 98-93

*Scutellaria parvula* Michx., Little skullcap, 1; I; 99-87

*Stachys tenuifolia* Willd., Smooth hedge-nettle, 6; R; 00-320

*Teucrium canadense* L., Canada germander, 10; R; 98-208

**Lauraceae**

*Sassafras albidum* (Nutt.) Nees, Sassafras, 1, 2, 3, 4; O; 98-223

**Linaceae**

*Linum medium* (Planch.) Britton var. *texanum* (Planch.) Fernald, Common yellow flax, 3, 4; O; 06-239

**Loganiaceae**

*Spigelia marilandica* L., Indian-pink, 2; I; 01-112

**Lythraceae**

*Ammannia coccinea* Rottb., Valley redstem, 9; S; 98-659

*Rotala ramosior* (L.) Koehne, Tooth-cup, 9, 10; A; 99-383

**Magnoliaceae**

*Liriodendron tulipifera* L., Tuliptree, 2, 3; S; 98-293

†*Magnolia grandiflora* L., Southern magnolia, 5; R; 06-224

**Malvaceae**

*Hibiscus laevis* All., Smooth rose-mallow, 9, 10; O; 99-387

\**Sida spinosa* L., Prickly sida, 10; S; 98-539

**Melastomataceae**

*Rhexia virginica* L., Wingstem meadow-beauty, 8; R; Woods 821

**Menispermaceae**

*Cocculus carolinus* (L.) DC., Carolina coralbeads, 2; I; 98-496

**Molluginaceae**

\**Mollugo verticillata* L., Carpetweed, 5, 10; O; 01-162

**Monotropaceae**

‡*Monotropa hypopithys* L., Pine-sap, 2; R; 98-217

**Moraceae**

*Maclura pomifera* (Raf.) C.K. Schneid., Osage-orange, 3; R; 01-169

*Morus rubra* L., Red mulberry, 2, 3; O; 98-195

**Nyssaceae**

*Nyssa aquatica* L., Swamp tupelo, 8; R; 02-151

*Nyssa sylvatica* Marshall, Blackgum, 2, 3, 4; A; 01-119

**Oleaceae**

*Fraxinus americana* L., White ash, 2, 3; I; 98-382

*Fraxinus pennsylvanica* Marshall, Green ash, 8; R; 98-357

†\*\**Ligustrum sinense* Lour., Chinese privet, 5; R; 99-393

**Onagraceae**

*Ludwigia alternifolia* L., Square-pod water-primrose, 6, 9; O; 98-516

*Ludwigia decurrens* Walter, Wingstem water-primrose, 9; R; 99-381

*Oenothera biennis* L., Common evening-primrose, 3, 5; O; 01-630

*Oenothera fruticosa* L. subsp. *fruticosa*, Common sundrops, 4; I; 99-188

*Oenothera speciosa* Nutt., White evening-primrose, 3; R; 98-02

**Oxalidaceae**

*Oxalis stricta* L., Common yellow wood-sorrel, 5; S; 01-108

*Oxalis violacea* L., Violet wood-sorrel, 1, 2; I; 99-80

**Passifloraceae**

*Passiflora incarnata* L., Maypop passion-flower, 2, 3; R; 00-325

*Passiflora lutea* L. var. *glabriflora* Fernald, Yellow passion-flower, 2; S; 98-373

**Phrymaceae**

*Phyrma leptostachya* L., Lopseed, 2; I; 98-279

**Phytolaccaceae**

*Phytolacca americana* L., American pokeweed, 5; I; 01-113



**Plantaginaceae**

*Plantago aristata* Michx., Bracted plantain, 5; I; 01-223

\**Plantago lanceolata* L., English plantain, 5; F; 98-74

*Plantago rugelii* Decne., Rugel's plantain, 5; F; 98-180

*Plantago virginica* L., Hoary plantain, 3, 5; O; 99-126

**Platanaceae**

*Platanus occidentalis* L., American sycamore, 7, 8; O; 98-201

**Polemoniaceae**

*Phlox divaricata* L., Forest phlox, 2; O; 99-23

†*Phlox paniculata* L., Summer phlox, 5; R; 99-321

**Polygalaceae**

*Polygala ambigua* Nutt., Loose milkwort, 4; I; 98-404

*Polygala sanguinea* L., Blood milkwort, 4; S; 98-124

**Polygonaceae**

*Brunnichia ovata* (Walter) Shinnery, Buckwheat vine, 8; O; 99-377

*Polygonum amphibium* L. var. *emersum* Michx., Water smartweed, 9; I; 98-652

\**Polygonum aviculare* L., Knotweed, 5, 10; O; 99-462

\*\**Polygonum caespitosum* Blume var. *longisetum* (Brujin) Steward, Asiatic smartweed, 5, 10; F; 01-638

*Polygonum hydropiperoides* Michx., False water-pepper, 9; O; 99-438

*Polygonum pensylvanicum* L., Pennsylvania smartweed, 10; I; 98-664

\*\**Polygonum persicaria* L., Spotted lady's thumb, 5, 10; O; 01-187

*Polygonum sagittatum* L., Arrowleaf tearthumb, 7, 9; O; 99-447

*Polygonum virginianum* L., Jumpseed, 2; I; 98-568

\*\**Rumex acetosella* L., Sheep sorrel, 5; F; 98-77

\**Rumex crispus* L., Curly dock, 5; I; 98-83

\**Rumex obtusifolius* L., Bitter dock, 5; I; 98-446

**Portulacaceae**

*Claytonia virginica* L., Spring-beauty, 5; O; 99-38

**Primulaceae**

*Lysimachia ciliata* L., Fringed loosestrife, 2; S; 99-254

*Lysimachia lanceolata* Walter, Lanceleaf loosestrife, 2; R; Hunter and Austin 1806

**Ranunculaceae**

*Anemone virginiana* L., Tall anemone, 2; I; 98-102

*Anemonella thalictroides* (L.) Spach., Rue-anemone, 2; O; 99-21

*Clematis virginiana* L., Virgin's-bower, 2; I; 98-447

*Myosurus minimus* L., Mouse-tail, 10; R; 99-49

*Ranunculus abortivus* L., Smooth smallflower crowfoot, 5; O; 99-08

‡*Ranunculus micranthus* (A. Gray) Nutt. ex Torr. & A. Gray, Hairy smallflower crowfoot, 5; I; 99-59

‡\*\**Ranunculus parviflorus* L., Stickseed buttercup, 5; R; 99-61

*Ranunculus recurvatus* Poir., Hooked buttercup, 2; I; 99-150

\**Ranunculus sardous* Crantz., Hairy buttercup, 5; O; 99-61

**Rhamnaceae**

*Ceanothus americanus* L., New Jersey tea, 1, 4; I; 98-149

**Rosaceae**

*Agrimonia rostellata* Wallr., Beaked agrimonia, 2; I; 98-549

*Amelanchier arborea* (F. Michx.) Fernald, Downy serviceberry, 1, 2; F; 99-25

‡\**Aphanes microcarpa* (Boiss. & Reut.) Rothm., Slender parsley piert, 5; S; *Poindexter* 06-152

*Crataegus mollis* (Torr. & A. Gray) Schelle, Downy hawthorn, 1; R; 99-278

*Fragaria virginiana* Duchesne, Wild strawberry, 3; I; 99-140

*Geum canadense* Jacq., White avens, 2; O; 98-209

*Porteranthus stipulatus* (Muhl. ex Willd.) Britton, Indian-physic, 1; F; 01-100

*Potentilla simplex* Michx., Old-field cinquefoil, 3, 4; F; 99-79

*Prunus americana* Marshall, American plum, 1; R; 02-218

*Prunus angustifolia* Marshall, Chickasaw plum, 1; I; 00-164

*Prunus serotina* Ehrh., Wild black cherry, 2, 3; F; 99-99

*Rosa carolina* L., Pasture rose, 1, 3; O; 98-560

\*\**Rosa multiflora* Thunb., Multiflora rose, 3, 4; S; 01-176

*Rosa setigera* Michx., Prairie rose, 3; I; 01-192

*Rubus allegheniensis* Porter, Common blackberry, 3; I; 98-244

*Rubus argutus* Link, Southern blackberry, 3, 4; F; 98-169

*Rubus flagellaris* Willd., Northern dewberry, 3, 4; F; 99-229

**Rubiaceae**

*Cephalanthus occidentalis* L., Buttonbush, 8; O; 01-206

*Diodia teres* Walter, Rough buttonweed, 3; F; 01-246

*Diodia virginiana* L., Virginia buttonweed, 7, 9, 10; F; 99-346

*Galium aparine* L., Cleavers, 3, 5; O; 99-119

*Galium circaezans* Michx., Forest bedstraw, 1; O; 02-217

\*\**Galium pedemontanum* (Bellardi) All., Piedmont bedstraw, 5; S; 98-78

*Galium pilosum* Aiton, Hairy bedstraw, 1, 3; O; 99-316

*Galium tinctorium* L., Swamp bedstraw, 9; I; 98-133

*Galium triflorum* Michx., Fragrant bedstraw, 2; O; 98-425

*Houstonia caerulea* L., Spring bluets, 5; F; 99-50

*Houstonia canadensis* Willd. ex Roem. & Schult., Canada bluets, 1; O; 99-135

*Houstonia pusilla* Schoepf, Small bluets, 5; O; 99-57

‡\**Sherardia arvensis* L., Field-madder, 5; R; *Poindexter* 06-142

**Salicaceae**

*Populus deltoides* W. Bartram ex Marshall, Eastern cottonwood, 8; S; 98-327

*Salix humilis* Marshall, Upland willow, 3; I; 99-415

*Salix nigra* Marshall, Black willow, 6, 8; O; 99-239

**Santalaceae**

*Comandra umbellata* (L.) Nutt. subsp. *umbellata*, Bastard toadflax, 1; I; 99-139

**Sapindaceae**

\**Cardiospermum halicacabum* L., Balloon-vine, 10; R; Fuller 3006

**Saururaceae**

*Saururus cernuus* L., Lizard's-tail, 9; I; 99-344

**Saxifragaceae**

*Heuchera americana* L., American alumroot, 2; S; 98-13

**Scrophulariaceae**

*Agalinis tenuifolia* (Vahl) Raf., Common false foxglove, 3; I; 01-616

*Aureolaria flava* (L.) Farw., Smooth foxglove, 1; S; 98-615

*Aureolaria pedicularia* (L.) Raf. var. *pectinata* (Nutt.) Gleason, Annual foxglove, 1; O; 01-624

‡*Leucospora multifida* (Michx.) Nutt., Cleftleaf Conobea, 5; O; 99-361

*Lindernia dubia* (L.) Pennell var. *anagallidea* (Michx.) Cooperr., False pimpernel, 9, 10; O; 99-437

*Lindernia dubia* (L.) Pennell var. *dubia*, False pimpernel, 9, 10; I; 99-389

*Mecardonia acuminata* (Walter) Small, Axilflower, 10; R; 98-653

*Mimulus alatus* Aiton, Sharpwing monkey-flower, 9; I; 98-515

*Mimulus ringens* L., Alleghany monkey-flower, 7; R; 98-494

*Penstemon digitalis* Nutt. ex Sims, Foxglove beardtongue, 1; I; 99-134

*Penstemon pallidus* Small, Eastern white beardtongue, 3; S; 01-116

\**Verbascum blattaria* L., Moth mullein, 3; R; 00-168

\**Verbascum thapsus* L., Common mullein, 3; R; 98-146

\**Veronica arvensis* L., Corn speedwell, 5; F; 98-55

*Veronica peregrina* L. subsp. *peregrina*, Purslane speedwell, 5; O; 99-48

*Veronicastrum virginicum* (L.) Farw., Culver's root, 1; R; 99-418

**Simaroubaceae**

\*\**Ailanthus altissima* (Miller) Swingle, Tree-of-heaven, 2; R; 01-231

**Solanaceae**

*Physalis pubescens* L., Downy ground-cherry, 10; I; 99-426

*Solanum carolinense* L., Bull-nettle, 3, 5; S; 98-339

*Solanum ptycanthum* Dunal ex DC., Black nightshade, 5; R; 99-396

**Staphyleaceae**

*Staphylea trifolia* L., Bladdernut, 2; R; 98-266

**Styracaceae**

*Styrax americanus* Lam., American snowbell, 8; I; 99-343

**Ulmaceae**

*Celtis occidentalis* L., Common hackberry, 2; I; 02-211

*Ulmus alata* Michx., Winged elm, 1, 2, 3, 4; F; 98-151

*Ulmus americana* L., American elm, 2; O; 98-220

*Ulmus rubra* Muhl., Red elm, 1, 3; F; 98-164

**Urticaceae**

*Boehmeria cylindrica* (L.) Sw., False nettle, 2, 7, 8; F; 98-292

*Pilea pumila* (L.) A. Gray, Clearweed, 2; O; 98-441

**Valerianaceae**

*Valerianella radiata* (L.) Dufur., Beaded corn-salad, 3; O; 99-74

**Verbenaceae**

*Phyla lanceolata* (Michx.) Greene, Frogfruit, 7, 9; O; 01-240

*Verbena simplex* Lehm., Narrowleaf vervain, 3; S; 98-50

*Verbena urticifolia* L., White vervain, 6, 9; I; 98-436

**Violaceae**

*Viola palmata* L., Threelobe wood violet, 2; O; 99-65

*Viola pedata* L., Bird'sfoot violet, 1; I; 99-78

*Viola rafinesquii* Greene, Field pansy, 3, 5; O; 99-36

*Viola sororia* Willd., Common blue violet, 5; F; 99-09

**Viscaceae**

*Phoradendron leucarpum* (Raf.) Reveal & M.C. Johnst., American mistletoe, 1; R; 06-757

**Vitaceae**

*Ampelopsis cordata* Michx., Raccoon-grape, 2; S; 99-364

*Parthenocissus quinquefolia* (L.) Planch., Virginia-creeper, 1, 2; A; 01-208

*Vitis aestivalis* Michx., Summer grape, 1, 2; F; 98-118

‡*Vitis palmata* Vahl, Red grape, 8; R; 01-217

*Vitis rotundifolia* Michx., Muscadine grape, 1, 2, 8; A; 01-114

**MAGNOLIOPHYTA—LILIOPSIDA****Agavaceae**

*Manfreda virginica* (L.) Salisb. ex Rose, False aloe, 1; R; 98-344

†*Yucca filamentosa* L., Spanish-bayonet, 5; R; 02-224

**Alliaceae**

*Allium canadense* L., Wild onion, 3; O; 99-240

\**Allium vineale* L., Field garlic, 3; I; 02-207

**Amaryllidaceae**

†\**Narcissus pseudonarcissus* L., Daffodil, 2; I; 99-17

**Araceae**

*Arisaema dracontium* (L.) Schott, Green-dragon, 2; R; 01-226

**Commelinaceae**

\*\**Commelina communis* L., Asiatic dayflower, 5; O; 06-231

\**Commelina diffusa* Burm. f., Creeping dayflower, 10; I; 98-671

*Commelina virginica* L., Virginia dayflower, 8; O; 98-669

**Convallariaceae**

*Maianthemum racemosum* (L.) Link var. *racemosum*, False Solomon's-seal, 2; I; 98-09

*Polygonatum biflorum* (Walter) Elliott, Smooth Solomon's-seal, 2; S; 99-272

**Cyperaceae**

‡*Carex albicans* Willd. var. *albicans*, Whitetinge sedge, 2; O; 99-159

*Carex blanda* Dewey, Eastern wood sedge, 2; O; 99-162

*Carex caroliniana* Schwein, Carolina sedge, 2; R; 99-123

*Carex cephalophora* Muhl. ex Willd., Oval-leaf sedge, 5; I; 99-120

†*Carex crinita* Lam. var. *crinita*, Fringed sedge, 7; O; 99-149

*Carex debilis* Michx. var. *debilis*, White-edge sedge, 2; O; 99-158

*Carex digitalis* Willd. var. *macropoda* Fernald, Slender wood sedge, 2; O; 99-163

‡*Carex frankii* Kunth, Frank's sedge, 9; S; 98-271

*Carex glaucoidea* Tuck., Blue sedge, 9; S; 98-19

*Carex grayi* J. Carey, Gray's sedge, 2; I; 06-222

*Carex hirsutella* Mack., Hairy green sedge, 3, 4; F; 01-134

*Carex laxiflora* Lam. var. *laxiflora*, Broad looseflower sedge, 2; I; 99-153

†*Carex lupulina* Muhl. ex Willd., Hop sedge, 7, 9; O; 01-233

*Carex lurida* Wahlenb., Yellow green sedge, 6; S; 99-213

*Carex muehlenbergii* Schkuhr ex Willd., Muhlenberg's sedge, 1; F; 01-130

*Carex nigromarginata* Schwein., Blackedge sedge, 2; R; 99-96

*Carex retroflexa* Muhl. ex Willd., Reflexed sedge, 2; O; 99-161

*Carex tribuloides* Wahlenb., Blunt broom sedge, 9; S; 01-215

*Carex typhina* Michx., Cattail sedge, 2, 9; S; 01-232

*Carex vulpinoidea* Michx., Fox sedge, 7; S; 98-75

*Cyperus echinatus* (L.) A. Wood, Globe flatsedge, 3, 6; S; 01-236

*Cyperus esculentus* L., Yellow nutsedge, 9; S; 99-444

*Cyperus pseudovegetus* Steud., Marsh nutsedge, 6, 9; S; 01-238

*Cyperus squarrosus* L., Bearded nutsedge, 8, 10; A; 99-436

*Cyperus strigosus* L., Strawcolor nutsedge, 6, 9; I; 01-234

‡*Eleocharis acicularis* (L.) Roem. & Schult., Needle spikerush, 10; A; 99-455

*Eleocharis ovata* (Roth) Roem. & Schult., Blunt ovate spikerush, 6; I; 98-444

*Fimbristylis autumnalis* (L.) Roem. & Schult., Slender fimbry, 9; A; 99-380

*Isolepis carinata* Hook. & Arn. ex Torr., Keeled bulrush, 6; S; Poindexter 06-161

‡*Kyllinga gracillima* Miq., Pasture spikesedge, 5; I; Poindexter 06-162

*Rhynchospora corniculata* (Lam.) A. Gray, Shortbristle horned beakrush, 9; I; 99-376

†*Schoenoplectus tabernaemontani* (K.C. Gmel.) Palla, Softstem bulrush, 7; S; 98-522

†*Scirpus atrovirens* Willd., Green bulrush, 7; I; 99-214

*Scirpus cyperinus* (L.) Kunth, Woolgrass, 6, 9; O; 98-554

*Scleria pauciflora* Mulh. ex Willd., Fewflower nutrush, 4; O; 99-235

*Scleria triglomerata* Michx., Whip nutrush, 4; O; 98-137

### Dioscoreaceae

‡\*\**Dioscorea oppositifolia* L., Chinese yam, 7; R; 99-250

*Dioscorea villosa* L., Wild yam, 2; O; 01-220

### Hemerocallidaceae

†\*\**Hemerocallis fulva* (L.) L., Orange day-lily, 5, 7; O; 99-258

### Hydrocharitaceae

*Najas guadalupensis* (Sprengel) Magnus, Southern water-nymph, 9; A; 99-457

### Hypoxidaceae

*Hypoxis hirsuta* (L.) Coville, Yellow star-grass, 1; I; 99-77

### Iridaceae

*Iris cristata* Soland. ex Aiton, Dwarf crested iris, 2; O; 99-69

†\**Iris pseudoacorus* L., Yellow flag, 7; S; 99-147

†*Iris virginica* L., Southern blue flag, 7, 8; O; 99-148

*Sisyrinchium angustifolium* Mill., Narrowleaf blue-eyed-grass, 3; O; 99-84

### Juncaceae

*Juncus acuminatus* Michx., Taperpoint rush, 6; I; 98-143

*Juncus biflorus* Elliott, Bog rush, 3, 6; O; 01-225

*Juncus brachycarpus* Engelm., Whiteroot rush, 6; I; 98-256

*Juncus diffusissimus* Buckley, Slimpod rush, 6; S; 99-287

*Juncus effusus* L. var. *solutus*. Fern. & Wieg., Soft rush, 6, 9; O; 02-202

*Juncus marginatus* Rostk., Grassleaf rush, 6; I; 98-153

‡*Juncus nodatus* Coville, Stout rush, 6; S; Poindexter 06-140

*Juncus tenuis* Willd., Slender path rush, 3, 5; A; 99-245

*Luzula bulbosa* (A. Wood) Rydb., Bulbous woodrush, 1, 2; F; 99-86

### Marantaceae

†*Thalia dealbata* Fraser ex Roscoe, Powdery alligator-flag, 7; S; 98-716

### Melanthiaceae

*Chamaelirium luteum* (L.) A. Gray, Devil's-bit, 2; R; 99-208

### Orchidaceae

*Spiranthes cernua* (L.) Rich., Nodding ladies'-tresses, 3; R; 98-641

*Spiranthes lacera* (Raf.) Raf. var. *gracilis* (Bigelow) Luer, Slender ladies'-tresses, 5; R; 98-611

*Spiranthes vernalis* Engelm. & A. Gray, Spring ladies'-tresses, 6; R; 98-212

*Tipularia discolor* (Pursh) Nutt., Crane-fly orchid, 2; S; 98-526

### Poaceae

\**Agrostis gigantea* Roth., Redtop, 6, 7; O; 00-326

\**Agrostis stolonifera* L., Creeping bent grass, 3; I; 99-133

*Alopecurus carolinianus* Walter, Carolina foxtail, 2; R; 99-47

*Andropogon ternarius* Michx., Splitbeard bluestem, 3, 4; O; 01-626

*Andropogon virginicus* L., Broom-sedge, 3, 4; F; 01-637

*Aristida dichotoma* Michx., Churchmouse three-awn, 3; F; 01-642

*Aristida longespica* Poir., Slimspike three-awn, 3; O; 01-640

*Brachyelytrum erectum* (Schreb.) P. Beauv., Bearded shorthusk, 2; O; 98-181

\**Bromus commutatus* Schrad., Hairy chess, 3, 5; O; 00-159

*Bromus pubescens* Muhl., Woodland brome, 2; O; 99-219

*Chasmanthium latifolium* (Michx.) H.O. Yates, Wood oats, 2; F; 99-378

\**Cynodon dactylon* (L.) Pers., Bermuda grass, 5; A; 98-352

\**Dactylis glomerata* L., Orchard grass, 3, 5; O; 02-200

*Danthonia spicata* (L.) P. Beauv., Poverty oat grass, 1; A; 01-111

*Dichanthelium acuminatum* (Sw.) Gould & C.A. Clark subsp. *fasciculatum* (Torr.) Freckmann & Delong, Hairy panic grass, 1, 3; A; 01-138

*Dichanthelium acuminatum* (Sw.) Gould & C.A. Clark subsp. *lindheimerii* (Nash) Freckmann & Delong, Hairy panic grass, 1, 3; I; 01-201

*Dichanthelium boscii* (Poir.) Gould & C.A. Clark, Bosc's panicum, 1, 2; F; 02-215

*Dichanthelium clandestinum* (L.) Gould, Deer-tongue panicum, 2, 6; O; 98-430

*Dichanthelium commutatum* (Schult.) Gould, Variable panic grass, 1, 3; F; 99-145

*Dichanthelium depauperatum* (Muhl.) Gould, Starved panic grass, 1; O; 01-133

*Dichanthelium dichotomum* (L.) Gould, Forking panic grass, 2; F; 98-17

- Dichanthelium laxiflorum* (Lam.) Gould, Looseflower panic grass, 1, 5; A; 98-23
- Dichanthelium polyanthes* (Schult.) Mohlenb., Manyflower panic grass, 2; O; 01-115
- Dichanthelium villosimum* (Nash) Freckmann subsp. *villosimum*, Longhair panic grass, 3; S; 99-203
- \**Digitaria ischaemum* (Schreb.) Schreb. ex Muhl., Smooth crab grass, 5, 10; I; 98-668
- \**Digitaria sanguinalis* (L.) Scop., Hairy crab grass, 5, 10; F; 99-448
- \*\**Echinochloa crus-galli* (L.) P. Beauv., Common barnyard grass, 6, 10; F; 99-446
- \*\**Eleusine indica* (L.) Gaertn., Yardgrass, 5; O; 98-300
- Elymus glaberrimus* (Vasey) Bush, Smooth wildrye, 3; O; 99-275
- Elymus virginicus* L. var. *virginicus*, Virginia wildrye, 2; O; 01-205
- ‡\*\**Eragrostis cilianensis* (All.) Vignolo ex Janch., Tufted love grass, 5; R; 98-605
- Eragrostis hypnoides* (Lam.) B.S.P., Teal love grass, 10; O; 98-666
- ‡*Eragrostis pectinacea* (Michx.) Nees, Tufted love grass, 5; O; 01-250
- Eragrostis spectabilis* (Pursh) Steud., Purple love grass, 3, 4; O; 98-593
- \*\**Festuca arundinacea* Schreb., Tall fescue, 3, 5, 6; A; 99-172
- \*\**Holcus lanatus* L., Velvet grass, 3, 6; S; 02-229
- Hordeum pusillum* Nutt., Little barley, 5; O; 06-234
- Leersia oryzoides* (L.) Sw., Rice cut grass, 7, 9; F; 98-655
- Leersia virginica* Willd., Virginia cut grass, 2; O; 98-598
- †\*\**Lolium perenne* L. var. *aristatum* Willd., Perennial rye grass, 3; I; 06-245
- Melica mutica* Walter, Twoflower melic grass, 2; S; 06-238
- \*\**Microstegium vimineum* (Trin.) A. Camas, Nepalese eulalia, 2; A; 01-631
- Muhlenbergia schreberi* J.F. Gmel., Nimblewill, 5; F; 98-693
- Muhlenbergia sobolifera* (Muhl.) Trin., Rock muhly, 2; I; 98-492
- Panicum anceps* Michx., Beaked panic grass, 6, 9; F; 99-382
- Panicum dichotomiflorum* Michx. subsp. *dichotomiflorum*, Fall panicum, 10; O; 98-679
- Panicum rigidulum* Bosc ex Nees, Redtop panicum, 9; F; 99-384
- \**Paspalum dilatatum* Poir., Dallis grass, 5; S; 00-327
- Paspalum floridanum* Michx., Florida paspalum, 9; I; 98-715
- Paspalum laeve* Michx., Smooth beadgrass, 5; F; 01-186
- \**Phleum pratense* L., Timothy, 3, 5; I; 02-220
- \*\**Poa annua* L., Annual bluegrass, 5; F; 06-226
- \*\**Poa compressa* L., Canada bluegrass, 5; O; 01-172
- \*\**Poa pratensis* L., Kentucky bluegrass, 5; A; 02-216
- Poa sylvestris* A. Gray, Woodland bluegrass, 2; I; 00-328
- Saccharum alopecuroides* (L.) Nutt., Silver plume grass, 2, 3; I; 01-632
- Schizachyrium scoparium* (Michx.) Nash, Little bluestem, 3, 4; A; 01-641
- \*\**Setaria faberi* R.A. Herrm., Nodding foxtail, 5; I; 01-188
- Setaria parviflora* (Poir.) Kerguelen, Knotroot foxtail, 3, 4; F; 98-597
- \**Setaria pumila* (Poir.) Roem. & Schult., Yellow foxtail, 5; I; 99-362
- Sorghastrum nutans* (L.) Nash, Indian grass, 3, 4; F; 98-642
- \*\**Sorghum halepense* (L.) Pers., Johnson grass, 3; O; 01-194
- Sphenopholis nitida* (Biehler) Scribn., Shiny wedge grass, 2; O; 99-102
- Tridens flavus* (L.) Hitchc., Purpletop, 3, 4, 5; F; 01-639
- Tripsacum dactyloides* (L.) L., Eastern gama-grass, 4; O; 98-97
- †\**Triticum aestivum* L., Wheat, 3; R; 01-135
- Urochloa platyphylla* (Nash) R.D. Webster, Signal grass, 3; R; 01-605
- Vulpia octoflora* (Walter) Rydb., Common six-weeks fescue, 2; A; 01-110

#### Ponteridiaceae

†*Pontederia cordata* L., Pickerel-weed, 7; R; 98-86

#### Potamogetonaceae

‡*Potamogeton pusillus* L., Slender pondweed, 6; F; 99-422

#### Smilacaceae

- Smilax bona-nox* L., Catbrier, 2, 3, 4; O; 98-117
- Smilax glauca* Walter, Glauous greenbrier, 2, 3, 4; F; 98-239
- Smilax hispida* Raf., Bristly greenbrier, 2; R; 99-223
- Smilax herbacea* L. var. *pulverulenta* (Michx.) A. Gray, Carrion-flower, 2; R; 99-370
- Smilax rotundifolia* L., Common greenbrier, 2, 3, 4; F; 99-273

#### Typhaceae

*Typha latifolia* L., Common cat-tail, 6, 7; F; 01-252

#### Uvulariaceae

*Uvularia sessilifolia* L., Sessileleaf bellwort, 2; O; 01-229

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